

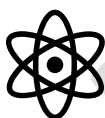
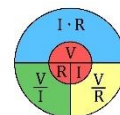
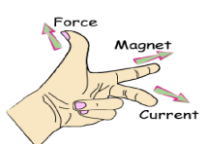


GOVERNMENT OF KARNATAKA
BANGALORE URBAN ZILLA PANCHAYAT
DEPARTMENT OF PUBLIC INSTRUCTIONS
BANGALORE NORTH DISTRICT, K.G ROAD, BANGALORE 560009

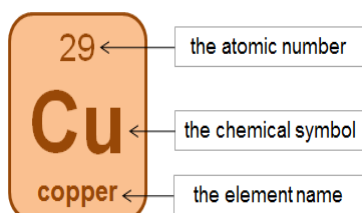
UTTARA UTTUNGA - 2

S.S.L.C

Exam Preparation Guide and Model Papers 2020-21



SCIENCE



S.S.L.C EXAM

2020 - 21

Exam Preparation Guide and Model Papers

83E – SCIENCE

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**Coming together is a beginning, keeping together is progress and
working together is success.**

SCIENCE BLUEPRINT

Design of the Question Paper Issued by K.S.E.E.B

5. ವಿಜ್ಞಾನ ವಿಷಯದ ನೀಲನಕಾಶೆ

ಪ್ರಸ್ತುತ ವರ್ಷದ ವಿಜ್ಞಾನ ಪ್ರಶ್ನೆಪತ್ರಿಕೆಯು ಮೂರು ಭಾಗಗಳನ್ನು ಹೊಂದಿದ್ದು ವಿವರ ಈ ಕೆಳಕಂಡಂತಿದೆ.

ಭಾಗ-ಎ / Part-A	ಭಾಗ-ಬಿ / Part-B	ಭಾಗ-ಸಿ / Part-C
ಭೌತಶಾಸ್ತ್ರ/Physics	ರಸಾಯನಶಾಸ್ತ್ರ/Chemistry	ಜೀವಶಾಸ್ತ್ರ/Biology
28 ಅಂಕಗಳು / Marks	25 ಅಂಕಗಳು / Marks	27 ಅಂಕಗಳು / Marks

ಕ್ರ. ಸಂ.	ಜ್ಞಾನಗ್ರಹಣ ಮಟ್ಟಕ್ಕೆ ಅಂಕ ಹಂಚಿಕೆ Weightage to Cognitive levels		ವಿಷಯಾಂಶಗಳಿಗೆ ಅಂಕ ಹಂಚಿಕೆ Weightage to Themes		ಕಠಿಣತೆಯ ಮಟ್ಟ Difficulty Level	
	ವಿವರ	ಅಂಕ ಹಂಚಿಕೆ		ಅಂಕ ಹಂಚಿಕೆ		
1	ಸ್ಮರಣೆ Remembering	20%- 16 ಅಂಕಗಳು	ನಿತ್ಯ ಜೀವನದಲ್ಲಿ ಪದಾರ್ಥಗಳು/ Materials in daily life	ಆಮ್ಲಗಳು, ಪ್ರತ್ಯಾಮ್ಲಗಳು ಮತ್ತು ಲವಣಗಳು/Acids, Bases & Salts ಲೋಹಗಳು ಮತ್ತು ಅಲೋಹಗಳು/ Metals & Non-Metals ಕಾರ್ಬನ್ ಮತ್ತು ಅದರ ಸಂಯುಕ್ತಗಳು/ Carbon & its compounds ಧಾತುಗಳ ಆವರ್ತನೀಯ ವರ್ಗೀಕರಣ/ Periodic classification of Elements	25 ಅಂಕಗಳು	ಸುಲಭ Easy 40%
2	ತಿಳುವಳಿಕೆ Understanding	55%- 44 ಅಂಕಗಳು	ಜೀವ ಜಗತ್ತು World of Living	ಜೀವ ಕ್ರಿಯೆಗಳು Life Processes ನಿಯಂತ್ರಣ ಮತ್ತು ಸಹಭಾಗಿತ್ವ/ Control & Co-ordination ಜೀವಿಗಳು ಹೇಗೆ ಸಂತಾನೋತ್ಪತ್ತಿ ನಡೆಸುತ್ತವೆ/ How do organisms reproduce? ಆನುವಂಶೀಯತೆ ಮತ್ತು ಜೀವ ವಿಕಾಸ /Heredity & Evolution	22 ಅಂಕಗಳು	ಸಾಧಾರಣ Average 50%
3	ಅನ್ವಯ Application	5% - 4 ಅಂಕಗಳು	ಸೈಸರ್ಗಿಕ ವಿದ್ಯಮಾನಗಳು Natural Phenomena	ಬೆಳಕು : ಪ್ರತಿಫಲನ ಮತ್ತು ವಕ್ರೀಭವನ / Light : Reflection & Refraction	8 ಅಂಕಗಳು	ಕಠಿಣ Difficult 10%
4	ಕೌಶಲ್ಯ Skill	20% - 16 ಅಂಕಗಳು	ವಸ್ತುಗಳು ಹೇಗೆ ಕಾರ್ಯ ನಿರ್ವಹಿಸುತ್ತವೆ? How do things work	ವಿದ್ಯುಚ್ಛಕ್ತಿ / Electricity ವಿದ್ಯುತ್ ಪ್ರವಾಹದ ಕಾಂತೀಯ ಪರಿಣಾಮಗಳು / Magnetic effects of electric current	17 ಅಂಕಗಳು	
ಒಟ್ಟು Total		80 ಅಂಕಗಳು	ಸೈಸರ್ಗಿಕ ಸಂಪನ್ಮೂಲಗಳು Natural resources	ಶಕ್ತಿಯ ಆಕರಗಳು/ Sources of Energy ಸೈಸರ್ಗಿಕ ಸಂಪನ್ಮೂಲಗಳ ಸುಸ್ಥಿರ ನಿರ್ವಹಣೆ / Sustainable management of Natural Resources ನಮ್ಮ ಪರಿಸರ / Our Environment	8 ಅಂಕಗಳು	
			ಒಟ್ಟು Total		80 ಅಂಕಗಳು	

ಕೌಶಲ್ಯಕ್ಕೆ ಸಂಬಂಧಿಸಿದಂತೆ ಉನ್ನತಮಟ್ಟದ ಆಲೋಚನಾ ಕೌಶಲ್ಯಗಳಿದ್ದು (HOTS-Higher Order Thinking Skills) 4 ಅಂಕಗಳನ್ನು ಚಿತ್ರ ರಚನಾ ಕೌಶಲ್ಯಕ್ಕೆ ಸೇರಿಸಲಾಗಿದೆ.

IMPORTANT NOTE:

Total 16 Marks allotted for Diagrams.

This year question paper consists of three parts.

Part – A : Physics, Part – B : Chemistry, Part – C : Biology

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Unit 1 : Acids, bases, and salts

I. Multiple choice questions

1. What is formed when zinc reacts with sodium hydroxide?

- (a) Zinc hydroxide and sodium (b) Sodium zincate and hydrogen gas
(c) Sodium zinc-oxide and hydrogen gas (d) Sodium zincate and water

Ans:- (b) Sodium zincate and hydrogen gas

2. Tooth enamel is made up of

- (a) calcium phosphate (b) calcium carbonate
(c) calcium oxide (d) potassium

Ans:- (a) Calcium phosphate

3. What is the pH range of our body?

- (a) 7.0 – 7.8 (b) 7.2 – 8.0 (c) 7.0 – 8.4 (d) 7.2 – 8.4

Ans:- (a) 7.0 – 7.8

4. Rain is called acid rain when its:

- (a) pH falls below 7 (b) pH falls below 6 (c) pH falls below 5.6 (d) pH is above 7

Ans:- (c) pH falls below 5.6

5. An aqueous solution turns red litmus solution blue. Excess addition of which of the following solution would reverse the change?

- (a) Baking powder (b) Lime
(c) Ammonium hydroxide solution (d) Hydrochloric acid

Ans:- (d) Hydrochloric acid

6. As the pH value of a neutral solution increases

- (a) basic property decreases and number of OH⁻ ions increase
(b) acidic property increases and number of H⁺ ions decrease
(c) basic property increases and number of OH⁻ ions increase
(d) acidic property decreases and number of H⁺ ions increase

Ans:- (c) basic property increases and number of OH⁻ ions increase

Short Answers questions.

- 1. Which gas is liberated when acid reacts with metals generally?**

Ans:- When acids react with metals, hydrogen gas is liberated.

- 2. Why does dry HCl gas not change the colour of dry litmus paper?**

Ans:- It is because acid dissociates into ions only in the aqueous solution.

- 3. What is the difference between strong acid and concentrated acid?**

Ans:- Strong acid: acid which dissociates into ions completely is called strong acid.
concentrated acid: acid which has less water content is called concentrated acid.

- 4. Why do acids not show acidic behavior in the absence of water?**

Ans:- It is because the dissociation of hydrogen ions from an acid occurs only in the presence of water (aqueous medium).

- 5. What is acid rain? How is it harmful to aquatic organisms?**

Ans:- When the pH of rain water is less than 5.6, we call it acid rain. It destroys the eggs of aquatic organisms.

- 6. Solutions of glucose and alcohol do not exhibit acidic property, why?**

Ans:- Solutions of glucose and alcohol do not exhibit acidic property because they do not dissociate into ions.

Long answer questions.

- 1. While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid?**

Ans: -

- Dilution of a concentrated acid is a highly exothermic reaction and a lot of heat is generated.
- Care must be taken while mixing concentrated acid with water. The acid must always be added slowly to water with constant stirring.
- Water is added to the concentrated acid, the heat generated may cause the mixture to splash out and cause burns. The glass container may also break due to excessive heat.

- 2. Draw diagram to show acid solution in water conducts electricity**

Ans:- Page number 22 Fig : 2.3

- 3. Draw diagram to show reaction of zinc granules with dilute sulphuric acid and testing hydrogen gas by burning.**

Ans:- Page number 19 Fig: 2.

Unit 2 : Metals and Non-metals

MULTIPLE CHOICE QUESTIONS.

- The most abundant metal in the earth's crust is**
(a) Iron (b) Aluminium (c) Calcium (d) Sodium
Ans:- (b) Aluminium
- Which property of metals is used for making bells and strings of musical instruments like Sitar and Violin?**
(a) Sonorous (b) Malleability (c) Ductility (d) Conductivity
Ans:- (a) sonorous
- $\text{Al}_2\text{O}_3 + 2\text{NaOH} \rightarrow \dots\dots + \text{H}_2\text{O}$**
(a) $\text{Al}(\text{OH})_3$ (b) Al_2O_3 (c) AlCl_3 (d) 2NaAlO_2
Ans:- (d) 2NaAlO_2
- Non-metals form covalent chlorides because**
(a) they can give electrons to chlorine
(b) they can share electrons with chlorine
(c) they can give electrons to chlorine atoms to form chloride ions
(d) they cannot share electrons with chlorine atoms
Ans:- (b) they can share electrons with chlorine
- The highly reactive metals like Sodium, Potassium, Magnesium, etc. are extracted by the**
(a) electrolysis of their molten chloride (b) electrolysis of their molten oxides
(c) reduction by aluminium (d) reduction by carbon
Ans:- (a) electrolysis of their molten chloride
- Which of the following non-metal is lustrous?**
(a) Sulphur (b) Oxygen (c) Nitrogen (d) Iodine
Ans:- (d) Iodine
- The atomic number of an element 'X' is 12. Which inert gas is nearest to X?**
(a) He (b) Ar (c) Ne (d) Kr
Ans:- (c) Ne
- Galvanisation is a method of protecting iron from rusting by coating with a thin layer of**
(a) Galium (b) Aluminium (c) Zinc (d) Silver
Ans:- (c) Zinc

9. **Reaction between X and Y forms compound Z. X loses electron and Y gains electron. Which of the following properties is not shown by Z?**

- (a) Has high melting point (b) Has low melting point
(c) Conducts electricity in molten state (d) Occurs as solid

Ans:- (d) Occurs as solid

10. **The electronic configurations of three elements X, Y and Z are X — 2, 8; Y — 2, 8, 7 and Z — 2, 8, 2. Which of the following is correct?**

- (a) X is a metal (b) Y is a metal (c) Z is a non-metal (d) Y is a non-metal and Z is a metal

Ans:- (d) Y is a non-metal and Z is a metal

11. **Copper objects lose their shine and form green coating of**

- (a) Copper oxide (b) Copper hydroxide and Copper oxide
(c) Basic Copper carbonate (d) Copper carbonate

Ans:- (c) Basic Copper carbonate

SHORT ANSWER QUESTIONS.

1. **Why are sodium, potassium and lithium stored under oil?**

Ans:- It is because they are highly reactive metals, react with air and water rapidly.

2. **What are alloys?**

Ans:- Alloys are homogeneous mixture of two or more metals, or a metal and non-metal.

3. **Food cans are coated with tin and not with zinc, why?**

Ans:- Zinc is more reactive than tin. And zinc can react with food elements preserved in it.

4. **State ways to prevent the rusting of iron.**

Ans:- Oiling, greasing, painting, galvanization (applying thin coating of zinc), chromium plating are the ways to prevent rusting of iron.

5. **Why is hydrogen not evolved when a metal reacts with nitric acid?**

Ans:- Hydrogen gas is not evolved when a metal reacts with nitric acid because HNO_3 (nitric acid) is a strong oxidising agent. It oxidises the H_2 produced to water.

6. **Define amalgam.**

Ans:- Amalgam is an alloy which consists mercury as one constituent

7. **What are amphoteric oxides? Give examples.**

Ans:- Amphoteric oxides are metal oxides which react both acids as well as bases to produce salts and water.

Ex: aluminium oxide (Al_2O_3), zinc oxide (ZnO)

LONG ANSWER QUESTIONS.

1. Differentiate calcination and roasting.

Ans:- Difference between calcination and roasting:

Calcination	Roasting
<ul style="list-style-type: none">• Heating carbonate ores at high temperature in the presence of excess air.• CO₂ is produced	<ul style="list-style-type: none">• Heating sulphide ores at high temperature in the limited supply of air• SO₂ is produced

2. Define thermite reaction and write its uses.

Ans:-

- The reaction of metal oxide to form metal by using aluminium powder as a reducing agent is known as thermite reaction. It is an exothermic reaction.
- The amount of heat produced is so high in this reaction, hence the metals are produced in the molten state.
- The reaction of iron(III) oxide(Fe₂O₃) with aluminium to produce iron in molten state.
- It is used to join railway tracks or cracked machine parts. This process is called thermite welding.



3. Distinguish metals and non metals based on physical and chemical properties.

Ans:- **Physical properties:**

Metals	Non-metals
Malleable	Non malleable (brittle)
Good conductors of heat and electricity	Poor conductors of heat and electricity
Sonorous	Non-sonorous

Chemical properties:

Metals	Non-metals
<ul style="list-style-type: none">• Electron donors, they are electropositive	<ul style="list-style-type: none">• Electron acceptors, they are electronegative
<ul style="list-style-type: none">• React with oxygen to form basic oxides	<ul style="list-style-type: none">• React with oxygen to form acidic oxides
<ul style="list-style-type: none">• They are reducing agents	<ul style="list-style-type: none">• They are oxidising agents.

4. **Name: (a) metal which is liquid at room temperature. (b) metal that can be easily cut with knife . (c)metal which is best conductor of electricity. (d) shiny non metal. (e) smooth alkali metals.**

Ans:- (a) mercury ,
(b) sodium,
(c)silver,
(d) Iodine,
(e) sodium, potassium, lithium

5. **Explain the process of electrolytic refining for copper with the help of a labeled diagram.**

Ans:- Diagram : Refer textbook Fig: 3.12, page number: 53

- In electrolytic process, the impure metal is made the anode and a thin strip of pure metal is made the cathode.
- A solution of the metal salt is used as an electrolyte.
- On passing the current through the electrolyte the pure metal from the anode dissolves into the electrolyte.
- An equivalent of pure metal from the electrolyte is deposited on the cathode
- At cathode: $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}(\text{deposited})$,
- At anode: $\text{Cu}(\text{s}) \rightarrow \text{Cu}^{2+} + 2\text{e}^-$

6. **A non metal X exists in 2 different forms Y and Z. Y is the hardest natural substance, whereas Z is a good conductor of electricity. Identify X, Y and Z.**

Ans:- A non metal X is carbon (C). Carbon exists in two different forms called the allotropes of carbon. These allotropes are diamond and graphite.

Y is diamond because diamond is the hardest natural substance and Z is graphite which is a good conductor of electricity.

7. **What is meant by electrolytic reduction? How is sodium obtained from its molten chloride? Explain.**

Ans:- Electrolytic reduction is process of extracting metals by the electrolysis of their salts.

- Sodium obtained by the electrolysis of its molten chloride.
- The metal is deposited at the cathode (the negatively charged electrode), whereas chlorine is liberated at the anode (the positively charged electrode).
- At cathode: $\text{Na}^+ + \text{e}^- \rightarrow \text{Na}$,
- At anode: $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$
- Reaction $\text{Na} \rightarrow \text{Na}^+ + \text{Cl}^-$

Unit 3 : Carbon and its compounds

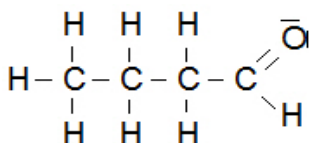
I. MULTIPLE CHOICE QUESTIONS.

1. Identify the compounds formed by catenation

- a. CO_2 & H_2CO_3 c. C_2H_2 & $\text{C}_2\text{H}_5\text{COOH}$
b. Na_2CO_3 & CH_3COOH d. CO & C_5H_{12}

Answer = C. C_2H_2 & $\text{C}_2\text{H}_5\text{COOH}$

2. The name of the compound with the following structural formula is,



- a. Butanol c. Butanone
b. Butanoic acid d. Butanal

Answer = d. Butanal

3. Hydrogenation of vegetable oils is an example for.....

- a. Addition reaction c. Substitution reaction
b. Combustion d. Oxidation reaction

Answer = a. Addition reaction

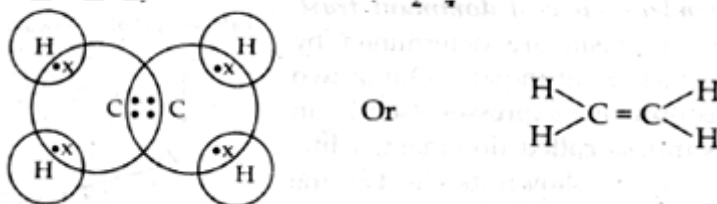
Very short answers 2/3/4 marks

4. Carbon can neither form C^{4+} cation nor C^{4-} anion . Why ?

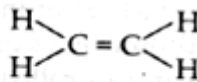
Ans:-

- (i) It is difficult for six protons in the nucleus of the carbon to hold ten electrons if it receives four extra electrons and hence it cannot form C^{4-} anion.
(ii) It would require a large amount of energy to remove four electrons leaving behind a carbon cation with six protons in its nucleus holding on to just two electrons.

5. Write the electron dot structure of ethene.



Or



6. What are detergents ?

Ans:- Detergents are generally sodium salts of sulphuric acids or ammonium salts with chloride or bromide ions.

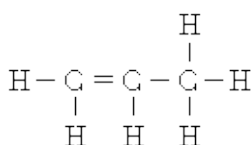
7. Write the differences between saturated and unsaturated carbon compounds.

Ans:-

Saturated carbon compounds	Unsaturated carbon compounds
<ul style="list-style-type: none"> Have single bond between the carbon atoms 	<ul style="list-style-type: none"> Have double or triple bond between the carbon atoms.
<ul style="list-style-type: none"> Less reactive than unsaturated compounds 	<ul style="list-style-type: none"> More reactive than saturated compounds.
<ul style="list-style-type: none"> Generally give a clean flame on combustion. Complete combustion Eg. Alkanes. 	<ul style="list-style-type: none"> Generally gives a yellow flame with black smoke. Incomplete combustion occurs. Eg. Alkenes & Alkynes

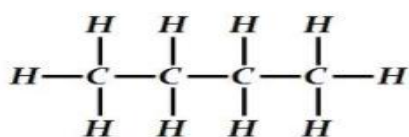
8. Write the structural formula and molecular formula of an alkene with three carbon atoms and name it.

Ans:- Propene :- C_3H_6

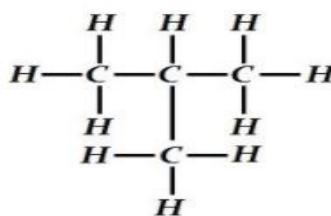


9. What are isomers? Give example

Ans:- Carbon compounds having same molecular formula but different structural arrangement are called isomers.



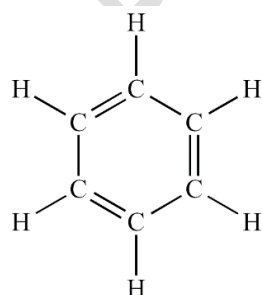
Butane
 C_4H_{10}



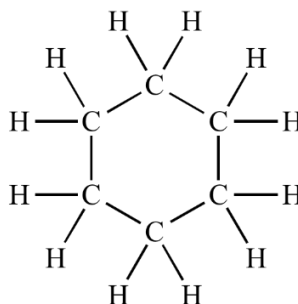
Iso-Butane
 C_4H_{10}

10. Write the structural formula for the following:-

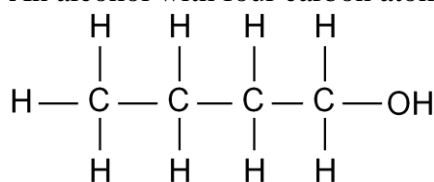
a. Benzene



c. cyclohexane



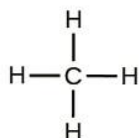
b. An alcohol with four carbon atoms



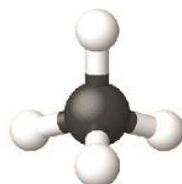
c. Simplest carbon compound



(a)



(b)



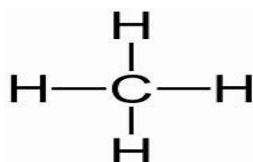
(c)



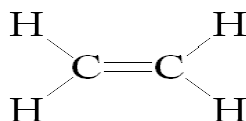
(d)

d. First alkane, alkene and alkyne members

Methane



ethene



ethyne



ethyne

Bonding in Carbon: The Covalent bond, Electron dot structure, Physical properties of organic compounds, Allotropes of Carbon.

Covalent Bond:

- The atomic number of carbon is 6. Its electronic configuration is 2, 4. It requires, 4 electrons to achieve the inert gas electronic configuration. But carbon cannot form an ionic bond
- It could gain four electrons forming C^{4-} anion. But it would be difficult for the nucleus with six protons to hold on to ten electrons.
- It could lose four electrons forming C^{4+} cations. But it requires a large amount of energy to remove four electrons.
- Thus, carbon overcomes this problem by sharing of its valence electrons with other carbon atoms or with atoms of other elements.
- The bond formed by mutual sharing of electron pairs between two atoms in a molecule is known as Covalent Bond.

Types of Covalent Bond:

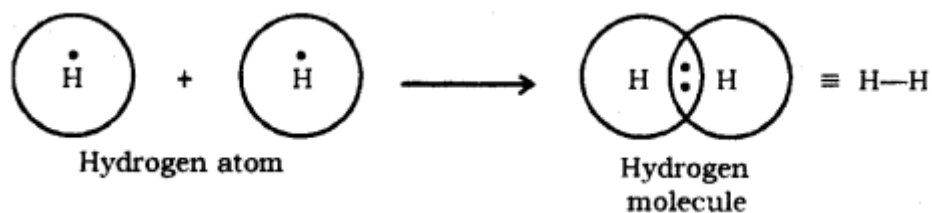
- **Single Covalent Bond:** When a single pair of electrons are shared between two atoms in a molecule. For example; F_2 , Cl_2 , H_2 etc.
- **Double Covalent Bond:** When two pairs of electrons are shared between two atoms in a molecule. For example; O_2 , CO_2 etc.
- **Triple Covalent Bond:** When three pairs of electrons are shared between two atoms in a molecule. For example; N_2 etc.

Electron Dot Structure: The electron dot structures provides a picture of bonding in molecules in terms of the shared pairs of electrons and octet rule.

Formation of Hydrogen Molecule

Atomic number of Hydrogen = 1

Number of valence electrons = 1



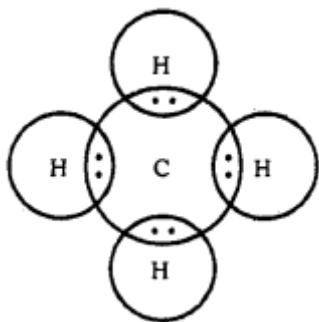
Formation of CH₄ Molecule

Atomic number of Carbon = 6 [2, 4]

Number of valence electrons = 4

Atomic number of Hydrogen = 1

Number of valence electrons = 1



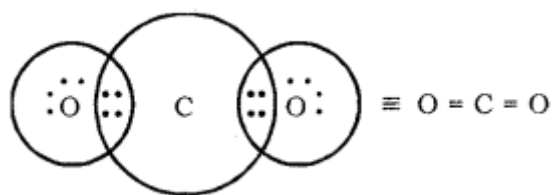
Formation of CO₂ Molecule

Atomic number of Carbon = 6 [2, 4]

Number of valence electrons = 4

Atomic number of Oxygen = 8 [2, 6]

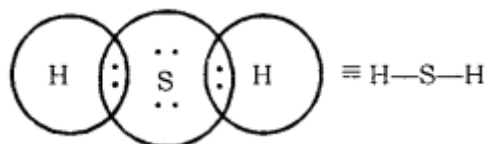
Number of valence electrons = 6



Formation of H₂S Molecule

Atomic number of Sulphur = 16 [2, 8, 6]

Number of valence electrons = 6



Physical Properties of Organic Compounds

Most of the organic compounds have low boiling and melting point, due to the weak force of attraction (i.e., the inter-molecular force of attraction) between these molecules.

Most carbon compounds are poor conductors of electricity, due to the absence of free electrons and free ions.

Compounds	M.P. (K)	B.P. (K)
Acetic acid (CH_3COOH)	290	391
Chloroform (CHCl_3)	209	334
Ethanol ($\text{CH}_3\text{CH}_2\text{OH}$)	156	351
Methane (CH_4)	90	111

Allotropes of Carbon

Allotropy: The phenomenon in which the element exists in two or more different physical states with similar chemical properties are called Allotropy.

Carbon has Three Main Allotropes

- **Diamond:** In this, carbon, an atom is bonded to four other atoms of carbon forming three-dimensional structures. It is the hardest substance and an insulator. It is used for drilling rocks and cutting. It is also used for making jewellery.
- **Graphite:** In this, each carbon atom is bonded to three other carbon atoms. It is a good conductor of electricity and used as a lubricant.
- **Buckminster Fullerene:** It is an allotrope of the carbon-containing cluster of 60 carbon atoms joined together to form spherical molecules. It is dark solid at room temperature.

Versatile nature of Carbon, Hydrocarbons, Isomerism, Homologous series, Functional groups, Nomenclature of functional groups.

Versatile Nature of Carbon: The existence of such a large number of organic compounds is due to the following nature of carbon,

- Catenation
- Tetravalent nature.

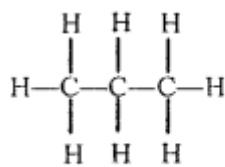
(i) **Catenation:** The self linking property of an element mainly carbon atom through covalent bonds to form long straight, branched and rings of different sizes are called Catenation.

This property is due to

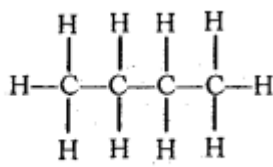
- The small size of the carbon atom.
- The great strength of the carbon-carbon bond.

Carbon can also form stable multiple bonds (double or triple) with itself and with the atoms of other elements.

Straight Chain

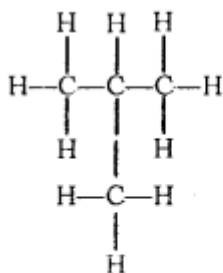


Propane

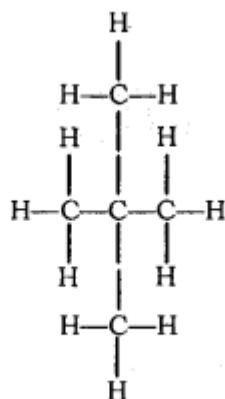


Butane

Branched Chain

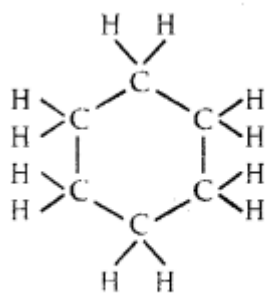


2-Methylpropane

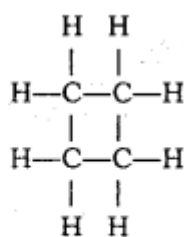


2, 2- Dimethylpropane

Rings

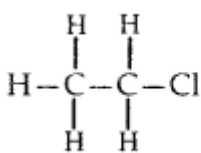


Cyclohexane

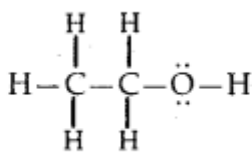


Cyclobutane

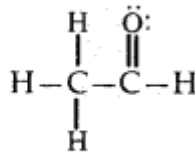
(ii) **Tetravalent Nature:** Carbon has valency of four. It is capable of bonding with four other atoms of carbon or some other heteroatoms with single covalent bond as well as double or triple bond.



Chloroethane

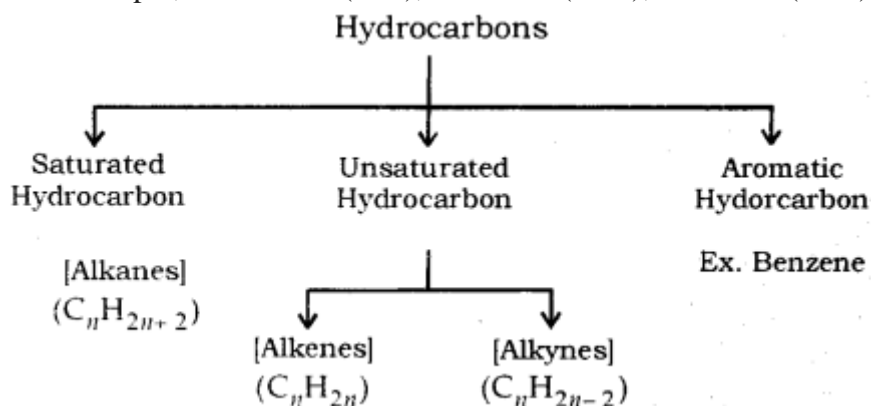


Ethanol



Ethanal

Hydrocarbons: Compounds of carbon and hydrogen are known as hydrocarbons. For example; Methane (CH_4), Ethane (C_2H_6), Ethene (C_2H_4), Ethyne (C_2H_2) etc.

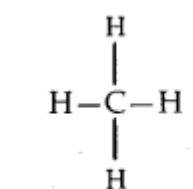


Saturated Hydrocarbon (Alkanes): General formula is $\text{C}_n\text{H}_{2n+2}$.

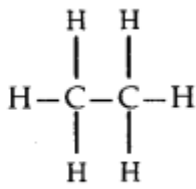
n = number of carbon atoms.

In this, the carbon atoms are connected by only a single bond.

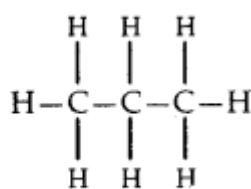
For example; Methane (CH_4), Ethane (C_2H_6) etc.



Methane ($n = 1$)



Ethane ($n = 2$)

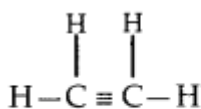


Propane ($n = 3$)

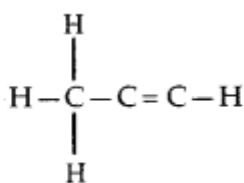
Unsaturated Hydrocarbons

Alkenes: General formula is C_nH_{2n} , where n = number of carbon atoms.

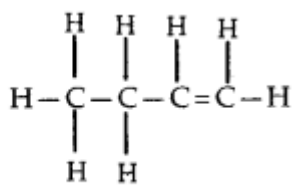
In this, the two carbon atoms are connected by double bond.



Ethene
(Ethylene)

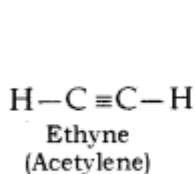


Propene

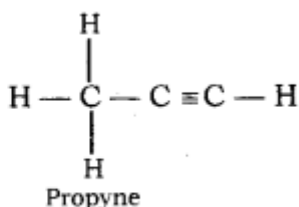


Butene

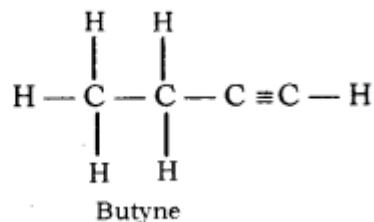
Alkynes: General formula is $\text{C}_n\text{H}_{2n-2}$, where n = number of carbon atoms. In this, the two carbon atoms are connected by triple bond.



Ethyne
(Acetylene)

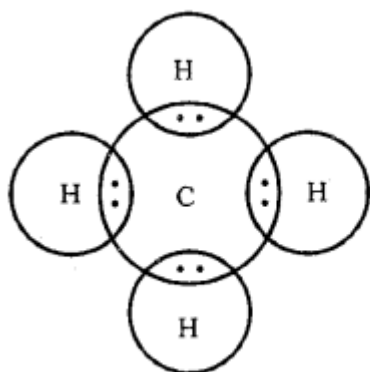


Propyne

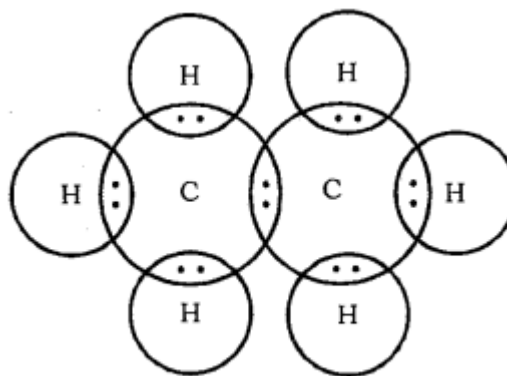


Butyne

Electron Dot Structure of Hydrocarbons



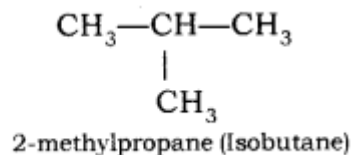
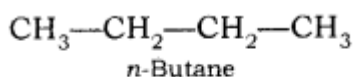
Methane



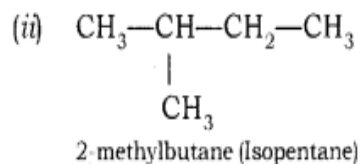
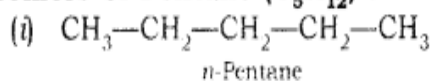
Ethane

Isomerism: Compounds having the same molecular formula but different structural formula and properties are known as Isomers and this phenomenon is known as Isomerism.

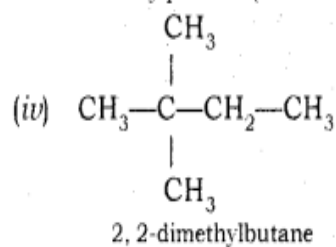
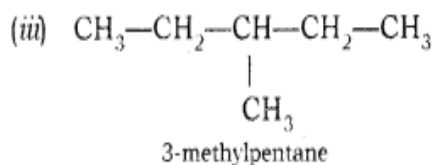
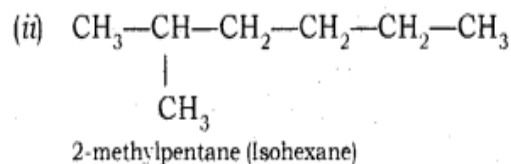
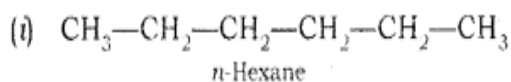
Structural Isomerism: Compounds having the same molecular formula but different structures are called Structural isomers. Example: Isomers of butane (C_4H_{10})



Isomers of Pentane (C_5H_{12}) :



Isomers of Hexane (C_6H_{14}) :



Homologous Series: Series of organic compounds having the same functional group and chemical properties and successive members differ by a CH_2 unit or 14 mass units are known as Homologous series.

Homologous series of Alkanes, Alkenes and Alkynes

- Alkanes :** Methane (CH_4)
Ethane ($\text{CH}_3\text{—CH}_3$)
Propane ($\text{CH}_3\text{—CH}_2\text{—CH}_3$)
- Alkenes :** Ethene ($\text{CH}_2 = \text{CH}_2$)
Propene ($\text{CH}_3\text{—CH} = \text{CH}_2$)
- Alkynes :** Ethyne ($\text{CH} \equiv \text{CH}$)
Propyne ($\text{CH}_3\text{—C} \equiv \text{CH}$)

Characteristic of Homologous Series

- The successive members in homologous series differ by CH_2 unit or 14 mass unit.
- Members of given homologous series have the same functional group.
- All the members of homologous series shows similar chemical properties.

Functional Group: An atom or group of atoms present in a molecule which largely determines its chemical properties are called Functional Group.

Functional Group	Formula of Functional Group
1. Halo- Chloro- Bromo-	—Cl —Br
2. Alcohol	—OH
3. Aldehyde	—CHO or $\begin{array}{c} \text{O} \\ \\ \text{—C—H} \end{array}$
4. Ketone	—CO— or $\begin{array}{c} \text{O} \\ \\ \text{—C—} \end{array}$
5. Carboxylic acid	—COOH or $\text{—CO}_2\text{H}$ or $\begin{array}{c} \text{O} \\ \\ \text{—C—O—H} \end{array}$

Nomenclature of Organic Compounds: It is difficult to remember millions of compounds by their individual common name. Thus, to systematize the nomenclature of organic compounds IUPAC (International Union of Pure and Applied Chemistry) has

S. No	Number of Carbon Atoms	Word Root (-) (Suffix)	Single bond
1.	One carbon atoms (1-C)	Meth	+ ane
2.	Two carbon atoms (2-C)	Eth	+ ane
3.	Three carbon atoms (3-C)	Prop	+ ane
4.	Four carbon atoms (4-C)	But	+ ane
5.	Five carbon atoms (5-C)	Pent	+ ane
6.	Six carbon atoms (6-C)	Hex	+ ane

given certain Rule which is as follows:

1. Identify the Number of Carbon Atoms in the Compound
2. Identify the functional group

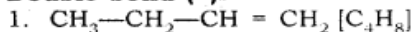
SI.No.	Functional Group	Prefix	Suffix
1.	Double bond (=)	—	ene
2.	Triple bond (\equiv)	—	yne
3.	Chlorine (—Cl)	Chloro	—
4.	Bromine (—Br)	Bromo	—
5.	Alcohol (-OH)	—	ol
6.	Aldehyde (-CHO)	—	al
7.	Ketone (-CO-)	—	one
8.	Carboxylic acid (-COOH)	—	oic acid

3. Name the Compounds By Following Order

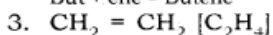
Prefix + Word Root + Suffix

Examples :

A. Double bond (=) :

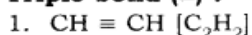


But + ene = Butene

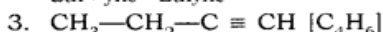


Eth + ene = Ethene

B. Triple bond (\equiv) :

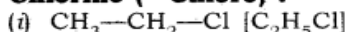


Eth + yne = Ethyne



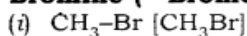
But + yne = Butyne

C. Chlorine (—Chloro) :

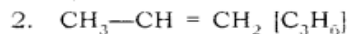


Chloro + ethane = Chloroethane

D. Bromine (—Bromo) :



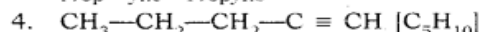
Bromo + methane = Bromomethane



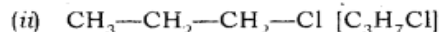
Prop + ene = Propene



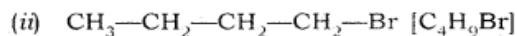
Prop + yne = Propyne



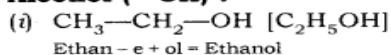
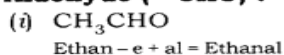
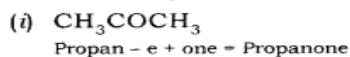
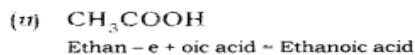
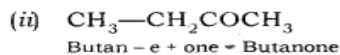
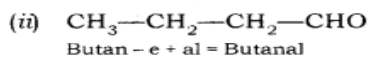
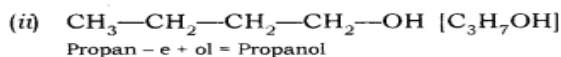
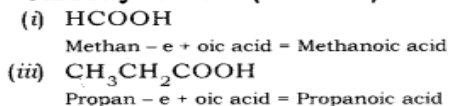
Pent + yne = Pentyne



Chloro + propane = Chloropropane

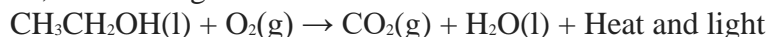


Bromo + butane = Bromobutane

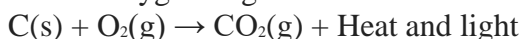
E. Alcohol (—OH) :**F. Aldehyde (—CHO) :****G. Ketone** $\left(\begin{array}{c} \text{O} \\ \parallel \\ \text{—C—} \end{array} \right) :$ **H. Carboxylic Acid (—COOH) :**

Chemical Properties of Carbon Compounds: The important chemical properties are as follows:

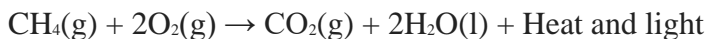
1. Combustion: The complete combustion of carbon compounds in the air gives carbon dioxide water, heat and light.



Carbon burns in air or oxygen to give carbon dioxide and heat and light.



Saturated hydrocarbons burn with a blue flame in the presence of a sufficient supply of air or oxygen.



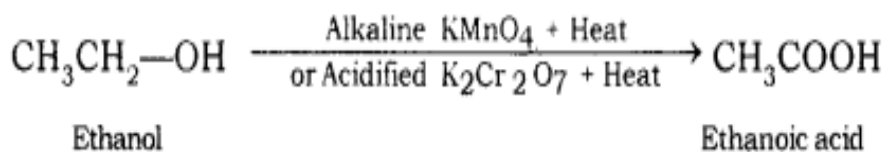
In presence of limited supply of air, saturated hydrocarbon forms a sooty flame.

Unsaturated hydrocarbons burn with a yellow smoky flame.

The gas and kerosene stove used at home has inlet for air so that, burnt to given clean blue flame.

Due to presence of small amount of nitrogen and sulphur, coal and petroleum produces carbon dioxide with oxides of nitrogen and sulphur which are major pollutant.

2. Oxidation: Oxidation of ethanol in presence of oxidizing agents gives ethanoic acid.



Oxidizing Agent: Some substances are capable of adding oxygen to others, are known as Oxidising Agent.

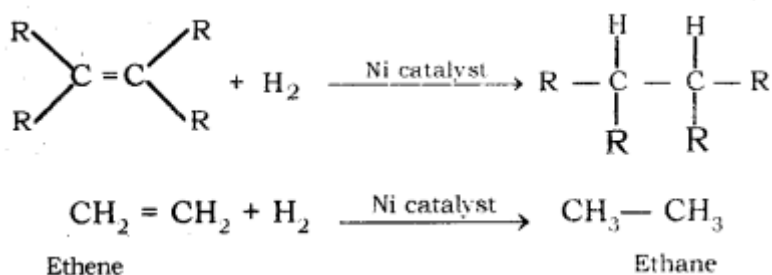
Example: Alkaline KMnO_4 (or $\text{KMnO}_4\text{---KOH}$)

Acidified $\text{K}_2\text{Cr}_2\text{O}_7$ (or $\text{K}_2\text{Cr}_2\text{O}_7\text{---H}_2\text{SO}_4$)

KMnO_4 – Potassium permanganate

$\text{K}_2\text{Cr}_2\text{O}_7$ – Potassium dichromate

3. Addition Reaction: Addition of dihydrogen with unsaturated hydrocarbon in the presence of catalysts such as nickel or platinum or palladium are known as Hydrogenation (addition) reaction.

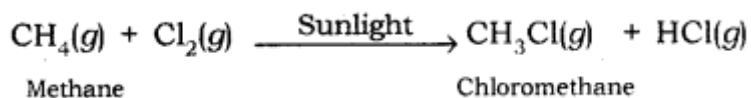


Catalyst: Substances that cause a reaction to occur or proceeds to different rate without consuming in it are called a catalyst. For example; Ni, Pt, Pd, etc.

Process of converting vegetable oil into solid fat (vegetable ghee) is called
Hydrogenation of Oil.

- Vegetable oil + H_2 gives Vegetable ghee
- Vegetable fats are saturated fats which are harmful for health.
- Vegetable oil containing unsaturated fatty acids are good for health.

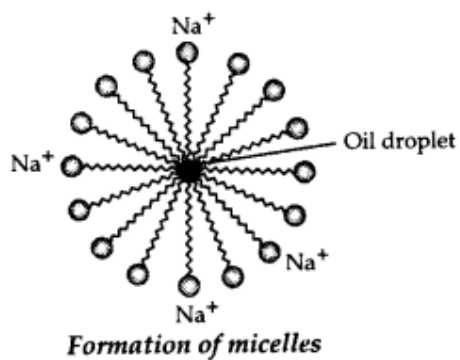
4. Substitution Reaction: Replacement of one or more hydrogen atom of an organic molecule by another atom or group of the atom is known as Substitution Reaction.



Cleansing action of soap:

The dirt is generally held to the surface of a dirty cloth by a thin film of oil or grease.

When a dirty cloth is treated with soap or detergent solution, the non- polar tail of the soap or the detergent dissolve in oil or grease while the polar heads are held by the surrounding water. Soap or detergent micelle is formed with the oily or greasy dirt lying at their Centre (Soap or detergent is attracted both by the greasy dirt and water).



When the surface of the cloth is mechanically scrubbed or beaten on a stone or with a wooden paddle or agitated in a washing machine, the loosened oily particle is removed from the dirty surface and the cloth is cleaned. Detergents lower the surface tension of water to a greater extent than soap, therefore the cleansing action of detergent is much higher than those of soaps.

Unit 4 : Periodic Classification Of elements

I. Multiple Choice Questions

1. Metalloid among the following is,

- a. Aluminium
- b. Boron
- c. Carbon
- d. Gallium

Answer:- b. Boron

2. The atomic number of an element is 7. The period and the group to which it belongs is,

- a. 2, 15 respectively
- b. 2, 3 respectively
- c. 4, 5 respectively
- d. 2, 5 respectively

Answer:- a. 2, 15 respectively

3. Atomic number was the basis for classification for

- a. Dobereiner's Classification
- b. Medeleev's Classification
- c. Newland's Classification
- d. Moseley's Classification

Answer:- d. Moseley's Classification

4. With increase in nuclear charge across the period,

- a. There is no change in atomic size
- b. Atomic size decreases
- c. Atomic size increases
- d. Atomic size increases till 9th group and then decreases

Answer:- b. Atomic size decreases

Answer the following questions:-

5. State Mendeleev's periodic law

Ans:- The properties of elements are periodic functions of their atomic masses.

6. Mendeleev selected hydrogen and oxygen as standard for his classification. Why?

Ans:- Mendeleev selected hydrogen and oxygen as they are very reactive and formed compounds with most elements.

7. Observe the given table..... (5)

Elements	i	ii	iii	iv	v	vi
Atomic Number	11	6	2	9	17	10

Answer the following questions:-

a. Identify the element that belongs to 18th group but does not exhibit octet structure. Why?

Ans:- (iii) 2. It's atomic number is 2 and have $1s^2$ configuration.

b. Identify the most electronegative element in the table and justify your answer.

Ans:- (iv) 9. Electronegativity increases across the period and decreases down the group.

c. Identify the element that readily donates electron. Name it

Ans:- (i) 11. Sodium

d. Identify the noble element

Ans:- (vi) 10.

e. Identify the period and group number of (ii)

Ans:- (ii) 6.

Electronic configuration:- $1s^2 2s^2 2p^2$

Period:- 2

Group:- 14

8. List the limitations of Newland's law of octaves.

Ans:- The limitations of Newland's law of octaves are:

(1) It was found that the Law of Octaves was applicable only up to calcium, as after calcium every eighth element did not possess properties similar to that of the first.

(2) It was assumed by Newlands that only 56 elements existed in nature and no more elements would be discovered in the future. But, later on, several new elements were discovered, whose properties did not fit into the Law of Octaves.

(3) Newland put two elements together in one slot and that too in the column of unlike elements having different properties.

Example: Cobalt and Nickel were put together in just one slot and that too in the column of elements like fluorine, chlorine, and bromine which were very different properties from these elements.

Trends in Modern Periodic Table: Valency, Atomic size, metallic and non-metallic characters, and Electronegativity.

(i) Valency: The valency of an element is determined by the number of valence electrons present in the outermost shell of its atom (i.e. the combining capacity of an element is known as its valency).

In Period: On moving from left to right in a period, the valency first increases from 1 to 4 and then decreases to zero (0).

Example ; Valency of 2nd period elements are :

	Li	Be	B	C	N	~	O	F	Ne
Valency	1	2	3	4	3		2	1	0

In Groups: On moving from top to bottom in a group, the valency remains same because the number of valence electrons remains the same.

Example: Valency of first group elements = 1

Valency of second group elements = 2.

(ii) Atomic size: Atomic size refers to radius of an atom. It is a distance between the centre of the nucleus and the outermost shell of an isolated atom.

In Period : On moving from left to right in a period, atomic size decreases because nuclear charge increases.

Example: Size of second period elements: $\text{Li} > \text{Be} > \text{B} > \text{C} > \text{N} > \text{O} > \text{F}$

Point to know: The atomic size of noble gases in corresponding period is largest due to presence of fully filled electronic configuration (i.e. complete octet).

In Group: Atomic size increases down the group because new shells are being added in spite of the increase in nuclear charge.

Example ; Atomic size of first group element : $\text{Li} < \text{Na} < \text{K} < \text{Rb} < \text{Cs} < \text{Fr}$

Atomic size of 17th group elements : $\text{F} < \text{Cl} < \text{Br} < \text{I}$

(iii) Metallic character: It is the tendency of an atom to lose electrons. In Period: Along the period from left to right, metallic characters decreases because a tendency to lose electron decreases due to the increase in nuclear charge. Example: Metallic character of second period elements: $\text{Li} > \text{Be} > \text{B} > \text{C} > \text{N} > \text{O} > \text{F}$

In Group: Metallic character, when moving from top to bottom increases because the atomic size and tendency to lose electrons increases.

Example: First group element : $\text{Li} < \text{Na} < \text{K} < \text{Rb} < \text{Cs}$

17th group elements: $\text{F} < \text{Cl} < \text{Br} < \text{I}$

(iv) Non-metallic character: It is tendency of an atom to gain electrons.

In Period: Along the period from left to right, non-metallic character increases because tendency to gain electrons increases due to increase in nucleus charge. Example ; Non-metallic character of 2nd period elements : $\text{Li} < \text{Be} < \text{B} < \text{C} < \text{N} < \text{O} < \text{F}$ In Group: On moving from top to bottom in a group, non-metallic character decreases because atomic size increases and tendency to gain electrons decreases. Ex. Non-metallic character of 17th period element: $\text{F} > \text{Cl} > \text{Br} > \text{I}$

(v) Chemical Reactivity

In metals: Chemical reactivity of metals increases down the group because tendency to lose electrons increases. Example ; $\text{Li} < \text{Na} < \text{K} < \text{Rb} < \text{Cs}$ (1st group) In non-metals: Chemical reactivity of non-metals decreases down the group because tendency to gain electrons decreases. Example: $\text{F} > \text{Cl} > \text{Br} > \text{I}$ (17th group)

(vi) Electronegativity: It is tendency of an element to attract the shared pair of electrons towards it in a covalently bonded molecule. It increases with increase of nuclear charge or decrease in atomic size.

Along the period electronegativity increases. Example ; $\text{Li} < \text{Be} < \text{B} < \text{C} < \text{N} < \text{O} < \text{F}$.

Down the group electronegativity decreases. Example ; $\text{Li} > \text{Na} > \text{K} > \text{Rb} > \text{Cs}$

$\text{F} > \text{Cl} > \text{Br} > \text{I}$

Non-metal oxides are acidic in nature. Ex. Cl_2O_7 , SO_3 , P_2O_5 ,

In the case of non-metal reactivity, decreases down the group because of the tendency to gain electrons decreases.

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The trend of atomic size (radius) in moving down a group: Ongoing down in a group of the Periodic Table, the atomic size increases because a new shell of electrons is added to the atoms at every step. There is an increase in distance between the outermost shell electrons and the nucleus of the atom.

The trend of atomic size (radius) in moving from left to right in a period: On moving from left to right along a period, the size of atoms decreases because on moving from left to right, the atomic number of elements increases which means that the number of protons and electrons in the atoms increases. Due to the large positive charge on the nucleus, the electrons are pulled in more closely to the nucleus and the size of the atom decreases.

Unit 5 : Life Process

I. Answer the following questions:

1. List three differences between arteries and veins.

Answer.

Arteries	Veins
<ul style="list-style-type: none">• Arteries carry oxygenated blood, away from the heart except pulmonary artery.• These are mostly deeply situated in the body.• These are thick-walled highly muscular except arteries of cranium and vertebral column.	<ul style="list-style-type: none">• Veins carry deoxygenated blood, towards the heart except pulmonary veins.• These are superficial and deep in location.• These are thin-walled.

2. List the three kinds of blood vessels of human circulatory system and write their functions in tabular form.

Answer. Three types of blood vessels in human circulatory system are: Arteries, Veins and Capillaries.

Their functions are tabulated below:

Arteries	Veins	Capillaries
Arteries carry oxygenated blood from heart to various organs of the body.	Veins carry deoxygenated blood from various organs to heart.	Exchange of materials between blood and surrounding cells take place in the capillaries.

3. What is the advantage of separate channels in mammals and birds for oxygenated and deoxygenated blood?

Answer.

It is necessary to separate oxygenated and deoxygenated blood in mammals and birds because they need high energy and large amount of oxygen. The separation of oxygenated and deoxygenated blood provides high oxygen supply to the organs.

4. State the functions of the following components of transport system:

(i) Blood (ii) Lymph,

Answer. The functions of blood and lymph are as follows:

(i) Blood

- Oxygen is transported by the blood to the tissues of the body for the breakdown of digested food.
- Carbon dioxide is transported to the lungs by the blood plasma.
- The digested and absorbed nutrients are transported by blood to the tissues. Nitrogenous wastes are transported to the kidneys.
- Regulates the body temperature and maintains the pH of the body tissues.
- It transports various hormones from one region to another and bring about the coordination.
- It maintains water balance to constant level.
- The lymphocytes produce antibodies against the invading antigens and protect from diseases.
- It helps in rapid healing of wounds by forming a clot at the site of injury.

(ii) Lymph

- It cleans the cellular environment.
- It returns proteins and tissue fluids to the blood .
- It provides a pathway for the absorption of fats and fat-soluble vitamins into the bloodstream.
- It defends the body against disease.

5. Name the process in plants where water is lost as water vapour.

Answer. Transpiration is the process when plants loose water as vapour.

6. What is 'translocation' in plants?

Answer. Translocation is the movement of soluble materials, products of photosynthesis from leaves to other tissues throughout the plant.

7. Name the component of blood that helps in the formation of blood clot in the event of a cut.

Answer. Platelets help in clotting of blood in the event of a cut.

8. Describe in brief the function of kidneys, ureters, urinary bladder and urethra.

Answer. The Kidneys filter the blood and concentrate the filtrate to make urine. They also help regulate blood pressure.

Ureters transport the urine to the urinary bladder.

Urinary bladder is like a holding tank for the urine until it's ready to be excreted. Urethra is the tube that connects the urinary bladder to the outside of the body for excretion.

9. Give reasons for: [SSLC July, 2018-19]

- (i) Oxygenated and deoxygenated bloods are separate in the heart of mammals.**
- (ii) Ventricles are thick walled.**

Answer.

- (i) This allows a highly efficient supply of oxygen, and meet their high energy needs (as they are warm-blooded animals).
- (ii) Because they have to pump blood throughout the body or into various organs

10. Explain how water and minerals are transported in plants?

Answer.

Transport of materials in Xylem: The movement of water and minerals absorbed by the plant's root from the soil through xylem elements tracheids and vessels are transported to other plant parts. Transpiration helps in upward conduction

Transport of materials in Phloem: Food synthesized in the leaves is transported through sieve tubes of phloem tissues to other parts both upwards and downwards.

11. (a) What is lymph?

(b) How is composition of lymph different from blood plasma?

(c) List two functions of lymphatic system.

Answer:

(a) Lymph is a tissue fluid, that contain plasma, proteins and blood cells which escapes into intercellular spaces.

(b) Lymph is colourless and contains less protein than plasma.

(c) Functions:

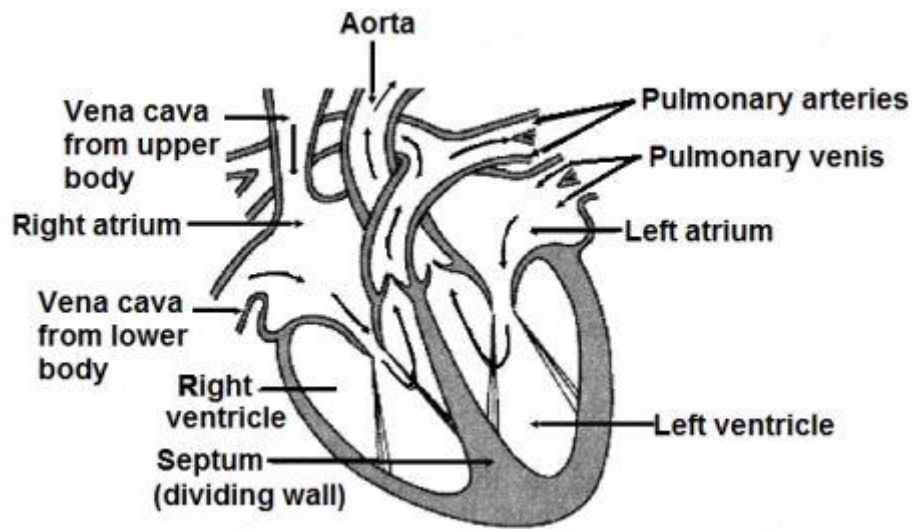
(i) Carries digested food

(ii) Drains excess fluid from extracellular space back into the blood.

12. Plants absorb water from the soil. Explain how does the water reach the tree top?

Answer: Xylem (vessels) of roots, stems and leaves are interconnected to form a continuous column. Roots also take up mineral salts actively, water moves in and as a result, it creates pressure which pushes the water up. Transpiration pull creates a suction force puffing up water.

13. Draw a diagram of cross-section of the human heart and label the following parts: (i) Right ventricle (ii) Aorta (iii) Left atrium (iv) Pulmonary arteries.

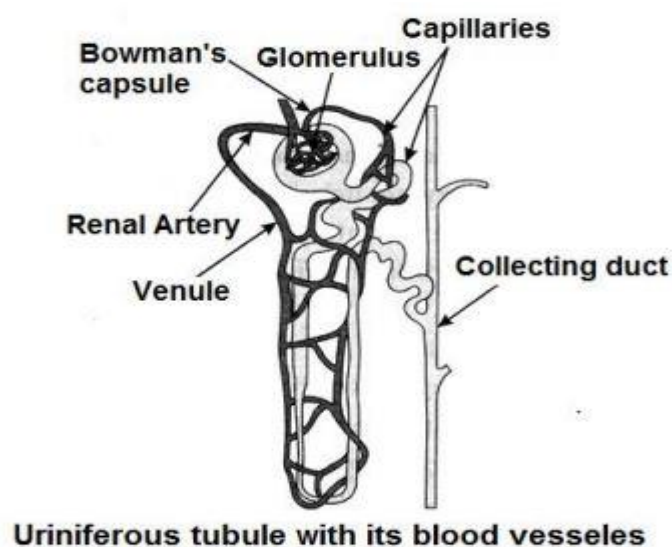


14. List any four strategies used by the plants for excretion?

Answer: Strategies used by plants for excretion are:

- (i) Many plant waste products are stored in cellular vacuoles.
- (ii) Waste products may be stored in leaves that fall off.
- (iii) Waste products are stored as resin and gums, especially in old xylem.
- (iv) They can get rid of excess water and oxygen through stomata.

15. (i) Draw a diagram of an excretory unit of a human kidney and label the following: Bowman's capsule, Glomerulus, Collecting duct, Renal artery. (ii) Write the important function of the structural and functional unit of kidney.



(ii) Function of nephron is filtration, reabsorption and secretion.

16. What are the differences between the transport of materials in xylem and phloem.?

Answer:

(a) Xylem:

- (i) It transports water and mineral.
- (ii) It involves upward movement. (Unidirectional)

(b) Phloem:

- (i) It transports food and hormones.
- (ii) It involves upward and downward movements (bidirectional).

17. Describe double circulation in human beings, Why is it necessary?

Answer: The human heart consists of two sides: right and left. The right side of the heart receives deoxygenated blood and sends it further for purification to lungs. The left side of heart receives oxygenated blood from the lungs which is pumped further and sent to all the parts of the body through blood vessels. This is called double circulation. The energy demands for human beings is too large and hence it is necessary for the separation of oxygenated and deoxygenated blood to meet this energy demand.

Unit 6 : Control and coordination

I . Answer the following Questions :

1. **How do the shoot and roots of a plant respond to the pull of earth's gravity?**

Answer: Roots grow downwards, towards gravity while shoot usually grow upwards and away from earth.

2. **Give an example of a plant hormone that promotes its growth. Where it is synthesized?**

Answer. Plant hormone that promotes growth is auxin. It is synthesized at the tip of the plant stem.

3. **Write one example each of the following tropic movements :**

(i) Positive phototropism (ii) Negative phototropism

(iii) Positive geotropism (iv) Negative geotropism

(v) Hydrotropism (vi) Chemotropism

Answer.

(i) Positive phototropism: shoots growing towards light.

(ii) Negative phototropism: roots growing away from light towards ground.

(iii) Positive geotropism: growth of roots towards earth due to the pull of the earth.

(iv) Negative geotropism: shoots growing away from the earth.

(v) Hydrotropism: roots growing towards the source of water.

(vi) Chemotropism: growth of pollen tubes towards the ovules.

4. **(a) Which plant hormone is present in greater concentration in the areas of rapid cell division?**

(b) Give one example of a plant growth promoter and a plant growth inhibitor.

Answer.

(a) Cytokinin is present in greater concentration in the areas of rapid cell division.

(b) An example of a plant growth promoter is gibberellins and example of a plant growth inhibitor is abscisic acid.

5. **What is chemotropism? Give one example. Name any two plant hormones and mention their functions.**

Answer.

Chemotropism is the movement of a part of the plant in response to a chemical stimulus.

It can be positive chemotropism or negative chemotropism. Example: The growth of pollen tube towards a chemical which is produced by an ovule during the process of fertilisation in a flower.

Two plant hormones with their functions are as follows:

Auxins promote cell elongation, root formation, cell division, respiration and other physiological processes like protein synthesis, etc.

Gibberellins stimulate stem elongation, seed germination and flowering.

6. A potted plant is made to lie horizontally on the ground. Which part of the plant will show

(i) positive geotropism?

(ii) negative geotropism?

Answer.

(i) Root

(ii) Shoot.

7. A young green plant receives sunlight from one direction only. What will happen to its shoots ?

Answer. Shoots will bend towards the light and roots away from the light.

8. Name the plant hormones which help/promote (i) cell division (ii) growth of the stem and roots?

Answer. The plant hormones which help or promote:

(i) Cell division — Cytokinins

(ii) Growth of the stem — Gibberellins

9. Describe the structure of neuron ?

Answer. Neurons have long finger like projections called dendrites, that extend out from the cell body. The extended projection is called the axon with nerve endings. The axon is surrounded by fatty myelin sheath. The cell body has nucleus at its centre.

10. What are plant hormones? Write two important functions of auxin.

Answer. Plant hormones can be defined as a chemical substance which is produced naturally in plants and are capable of translocation and regulating one or more physiological processes when present in low concentration. .

Two important functions of auxin are that it promotes cell elongation, root formation, cell division, etc.

11. Define positive geotropism and negative geotropism. Give one example of each.

Answer: The movement of plant part in response to gravity is called geotropic movement and the phenomenon involved is called geotropism. When the tip of the stem grows away from the earth's gravitational forces, it is known as negative geotropism and when the root tips grow towards gravity, it is known as positive geotropism. E.g., Stem shows negative geotropism. Roots show positive geotropism.

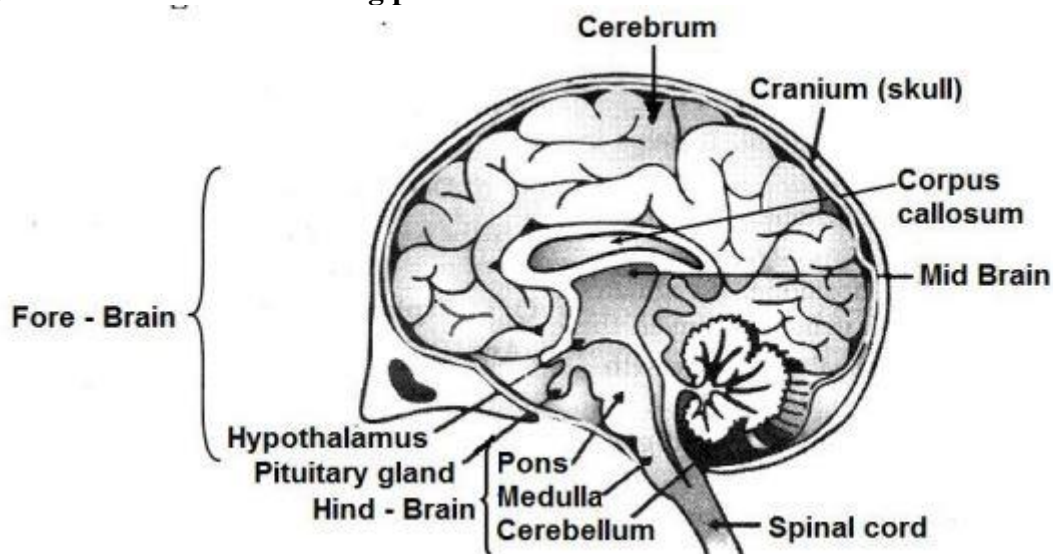
12. (i) What is a reflex action? (ii) Give example of involuntary action.

Answer:

(i) Reflex action is defined as an unconscious and involuntary response of effectors to a stimulus.

(ii) Involuntary action: Beating of heart, salivation in the mouth on chewing of tasty food.

13. Draw a neat diagram of human brain and label on it the following parts: (i) Mid brain (ii) Pituitary gland (iii) Cerebellum (iv) Cerebrum
b) Which is the main thinking part of brain?

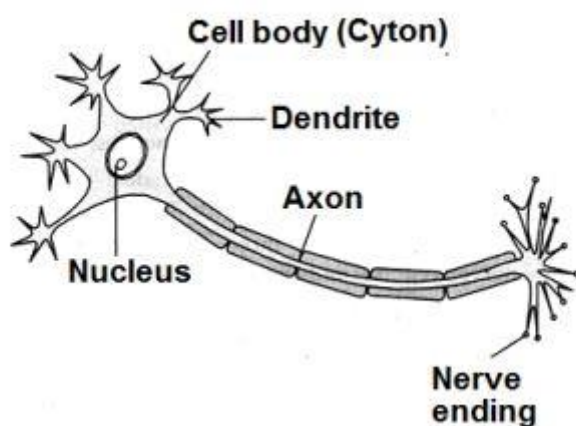


b) Fore-brain.

14. Write three main functions of the nervous system.

Answer: (i) Collects information from the surroundings. (ii) Controls and co-ordinates the movement of muscles. (iii) Helps to recognise smell, taste, vision, hearing etc. with the help of sense organs.

- 15.(a) Draw the structure of neuron and label cell body and axon. (b) Name the part of neuron: (i) Where the information is acquired. (ii) Through which information travels as an electrical impulse.



b) (i) The information is acquired at the end of the dendrite tip of a nerve cell (ii) The information travels as an electrical impulse from the dendrite to the cell body and then along the axon to its end.

16. 'Brain and Spinal cord are two vital organs of our body'. How is our body designed to protect them?

Answer: Brain and spinal cord are the parts of central nervous system. Brain is located inside a bony box, named as cranium and a fluid is present in this balloon, known as

cerebrospinal fluid which is a shock absorber. Spinal cord is placed in a vertebral column and back bone protects it.

17. What happens at the synapse between two neurons?

Answer: At synapse the electrical impulse generated at dendrites of a neuron is passed on to dendrite of another neuron in the form of chemicals by axon ending of the first neuron.

18. Why is use of iodised salt advisable?

Answer: Iodine is necessary to make thyroxine hormone which regulates carbohydrates, protein and fat metabolism in the body so as to provide the best balance for growth.

19. Why are some patients of diabetes treated by giving injections of insulin?

Answer: Insulin regulates the sugar level in the blood. When this hormone is not synthesised in proper amount then the sugar level in the blood rises and the persons suffer from diabetes. This is the reason why diabetic patients are treated by giving injections of insulin.

Unit 7 : How do organisms reproduce?

I. Answer the following Questions:

1. What is sexual reproduction?

- It is a type of reproduction which involves the fusion of male and female gametes produced by two parents' male and female.

2. What are the advantages of sexual reproduction?

- Sexual reproduction creates variations which are useful for ensuring survival of species and species formation.

3. Why is reproduction necessary even though it is not a life process?

- Even though it is not a life process like nutrition, respiration and excretion. It is necessary to continue their progeny.

4. What is puberty?

- As the rate of General body growth begins to slow down reproductive tissue begin to mature. This period during adolescence is called puberty.

5. How does the embryo get nutrition?

- The embryo gets nutrition from the mother's blood with the help of a special tissue called placenta.

6. List the parts of male reproductive system in human beings.

- Male reproductive system consists of testis which produce sperms, vas deference, seminal vesicle, prostate glands, urethra and penis.

7. List the parts of female reproductive system in human beings.

- The female reproductive system in human beings consists of ovaries Fallopian, tubes, uterus and vagina.

8. What is the role of seminal vesicle and prostate glands?

- Seminal vesicles and prostate glands secrete fluids which help in the transportation of sperms easier and this fluid provides nutrition.

9. Where are sperms produced? What is the structure of sperm?

- Sperms are produced in testis.
- The sperms are tiny bodies that consists of mainly genetic material and a long tail that helps them to move towards the female germ cell.

10. Why are scrotum located outside the abdominal cavity?

- Sperms are produced in scrotum which are located outside the abdominal cavity because sperm formation requires a lower temperature than the normal body temperature.

11. How is embryo formed?

- Sperms fertilize the egg to form zygote.
- zygote implants in the lining of the uterus and starts dividing.
- This forms of mass of cells called embryo, which develops the body parts later.

12. How does the embryo get nourishment inside the mother's body?

- The embryo gets nutrition from the mother's blood with the help of a special tissue called placenta
- Placenta is a disk like tissue which develops between the uterus uterine wall and embryo.
- It has villi on embryo side of the tissue it has blood space on the mother's side which surround the Villi.
- This provides a large surface area for glucose and oxygen to pass from the mother to the Embryo.
- Embryo generates waste substances, which are removed by transferring them into mother's blood through placenta.

13. What happens when the egg is not fertilized?

- Ovaries release one egg every month.
- The uterus prepares itself every month to receive fertilized egg.
- It's lining becomes thick and spongy to nourish the embryo if fertilized.
- This lining is not needed any longer if the egg is not fertilized.
- So the lining slowly breaks and comes out through the vagina as blood and mucus, which is known as menstruation.
- This Cycle takes place roughly every month. It lasts for about 2 to 8 days.

14. What are the changes seen in girls at the time of puberty?

- The changes seen in girls at the time of puberty are as follows.
- Growth of hair in armpits and pubic region
- Breast size begins to increase with darkening of skin of the nipples at the tip of the breasts.
- Girls begin to menstruate at around this time.

15. What are the changes seen in boys at the time of puberty?

- Changes seen in boys at the time of puberty are
- New thick hair growth on the face.
- Their voice begin to crack
- Penis occasionally begins to become enlarged and erect either in day dream or at night.

16 a) What is pollination?

b) Mentioned the types of pollination?

c) What are the agents required for cross pollination?

- a) Transfer of pollen grains from anther to stigma is known as pollination.
- b) There are two types of Pollination. They are Self pollination and Cross pollination
- c) The agents required for cross-pollination are wind, water, insects, birds and animals.

17 a) What is germination?

b) What is the function of plumule and radical?

- The seed contains the future plant or embryo which develops into a seedling under appropriate conditions. This process is known as germination.
- The plumule will develop into future shoot and the radical develops into future root.

18 What are sexually transmitted diseases STDs? Give you examples.

- The diseases which are transmitted from one person to another through sexual act are called STD
- Examples are Bacterial diseases-gonorrhea, syphilis.
- Viral diseases warts, HIV/AIDS

19 a) Name the different contraceptive methods.

b) What is the side effect of using oral pills?

c) What is the side effect of using copper-T?

- There are many ways have been devised to avoid pregnancy.
- Barrier method -use of condoms
- Chemical methods- oral pills and vaginal pills
- Surgical methods vasectomy and tubectomy
- b) Hormonal imbalance
- c) Causes irritation of the uterus

20 Why is DNA copying an essential part of the reproduction?

- Chromosomes in the nucleus of the cell contain information for inheritance of features from parent to Next Generation in the form of DNA.
- The DNA in the cell nucleus is the information source of making proteins. Therefore a basic event in reproduction is create another DNA copy for the Next Generation

21 In a hibiscus flower anthers are removed and Pistil is left as it is. Does pollination take place in that flower? How?

- Yes pollination takes place. Hibiscus is a bisexual flower. If only anthers are removed Self-pollination will not take place. But cross-pollination can take place with the help of Agents like insects, birds, wind, water or animals.
- **Diagrams : Longitudinal section of a flower and Germination of Pollen on stigma**

Unit 8 : Heredity and Evolution

I . Answer the following questions :

1. What is gene?

- Gene is the unit of heredity which is linear segment of DNA in chromosome. It take part in expressing a particular character.

2. What is speciation?

- The process by which new species develop from the existing species.

3. What is genetic drift?

- It is the mechanism of evolution in which allele frequencies of a population change over generations due to chance

4. Name the two methods used to determine the age of fossils.

- Relative method and carbon dating method

5. What is the ratio of plants obtained in F₂ generation in a dihybrid cross?

- The ratio is 9:3:3:1

6. A study found that children with light coloured eyes are likely to have parents with light coloured eyes. On the basis can we say anything about whether light eye colour trait is dominant or recessive. Justify your answer.

- Light eye colour is dominant because only dominate characters are expressed in F₁ generation.

7. How do the genes control a trait? Explain with an example.

- Height of the plant depends on the amount of plant hormone produced
- The amount production of phytohormone depends on efficiency of plant
- More amount of hormone is produced if the enzyme performs its function properly and the plant grows tall.
- If the gene in the enzyme changes the amount of hormone produced decreases and plant become dwarf.

8. Can the wing of a butterfly and wing of a bat be considered homologous organs? Why or why not?

- No, the wing of a butterfly and wing of a bat are not anatomically similar structure though they perform same function. They are analogous organs.

9. Birds and reptiles are very close in evolutionary terms. Justify the statement.

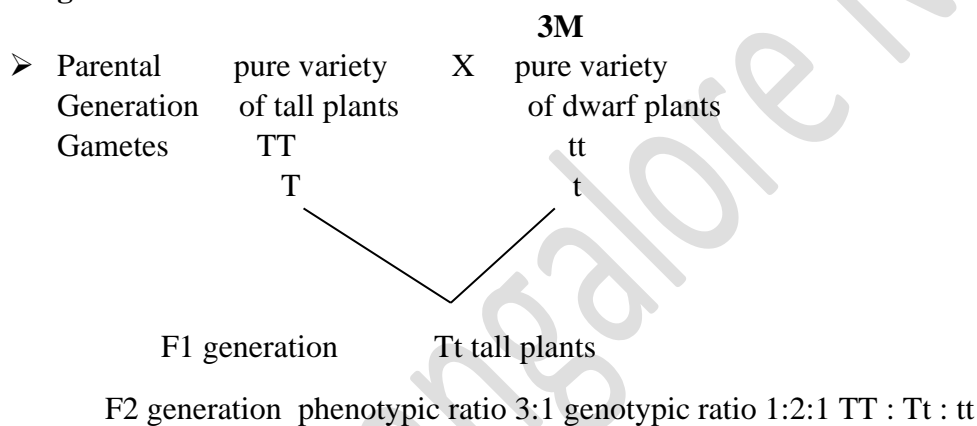
- Fossil evidences shows that feathers can start out as providing insulation from cold weather. But later, they might become useful for flight. Infact some dinosaurs had feathers, although they could not fly using the feathers. Birds seem to have later adapted the feathers to flight. This, of course, means that birds are very closely related to reptiles, since dinosaurs were reptiles.

10. Even though human beings and chimpanzee are very close in evolutionary terms, more variations are seen in human community than chimpanzees.

Explain.

- Human community is larger than chimpanzees. So more variations are seen.
- Since the chimpanzees community is smaller less gene flow is which means less variations.

11. Sketch the schematic representation of inheritance of a single trait over two generations.



12. With the help of a checker board, show the ratio of plants obtained in F2 generation when tall plants with white flowers are crossed with dwarf plants with violet flowers.

- Tall plants with white flowers X Dwarf plants with violet flowers

Gamets	T	t
T	TT	Tt
t	Tt	tt

3M

TTWW X ttww

F1 generation TtWw (tall plants with white flowers)

F2 generation TW, Tw, tW, tw

Gamets

Gamets	TW	Tw	tW	tw
TW	TTWW	TTWw	TtWW	TtWw
Tw	TTWw	TTww	TtWw	Ttww
tW	TtWW	TtWw	ttWW	ttWw
tw	TtWw	Ttww	ttWw	ttww

tall plants with white flowers -9
tall plants with violet flowers -3
dwarf plants with white flowers -3
dwarf plants with violet flowers -1

The ratio is 9:3:3:1

13. Humans are at the top of evolutionary ladder. Do you agree with the statement? Give reason.

- Don't agree with the statement. Humans are just species in evolution.
- Humans have more complicated body design than other organisms
- Organisms having simple body can survive in extreme climatic conditions in which human beings cannot survive

14. While digging the mud of a hill to construct a road fossils were found at 24,38,47 and 60 feet respectively. Which among this is the oldest and why?

- The fossil found at 60 feet is the oldest one. Because according to relative study of fossils, the fossils which are found closer to the surface are more recent than the fossils we find in deeper layers.

15. According to anatomical studies, there are similarities between human hands, forelimbs of horse and claws of a cat and they are evolved from common ancestor.

- a. What conclusion can you draw from the above statement.
 - b. What are these organs called?
- a. even though they have similar basic structure, they perform different functions
 - b. they are called Analogous Organs.

16. What are the factors responsible for the formation of new species?

- Gene flow and Natural Selection.
- Change in chromosomal number
- Reproduction among geographically isolated species

17. How is sex determined in humans?

- Woman have a perfect pair of sex chromosomes, both called X
- Men have a mismatched pair in which one is normal sized X while the other one is called Y
- So woman are XX, and men are XY
- A child who inherits an X chromosome from father will be a girl
- A child who inherits an Y chromosome from father will be a boy

18. Name some vegetables which are generated from wild cabbage

- Kohlrabi, cauliflower, broccoli, cabbage, red cabbage and kale

19. What are homologous and analogous organs? Explain with examples.

- Homologous organs have the same basic structure and origin, but perform different functions.
- Eg. forelimbs of frog, a bird and a man
- Analogous organs have the different basic structure and origin, but have similar appearance perform same functions.
- Wings of insects and wings of birds

20. Why are human beings who look so different from each other in terms of size, colour and looks said to belong to same species?

- All human beings who look so different from each other in terms of size, colour and looks said to belong to same species *Homo sapiens* because they have similar DNA sequence and have descended from same ancestors
- They are capable of reproducing among themselves.

Unit 9 : LIGHT – REFLECTION AND REFRACTION

I. TERMS AND DEFINATIONS

1. **Refraction of light:** The change in the direction of light when it travels from one transparent medium to another is called Refraction of Light.
2. **Angle of incidence:** The angle between incident and the normal at the point of incidence is angle of incidence.
3. **Angle of refraction:** The angle between refracted ray and the normal at the point of incidence is angle of refraction.
4. **Rarer medium:** A medium in which the speed of light is more.
5. **Denser medium:** A medium in which the speed of light is less.
6. **Refractive index:** It is ratio of speed of light in air to speed of light in the medium.
7. **Lens:** A piece of transparent material bounded by two spherical surfaces.
8. **Convex lens:** A lens which is thick at the centre but thin at the edges. [Converging lens]
9. **Concave lens:** A lens which is thick at the edges but thin at the centre. (Diverging lens)
10. **Power of lens:** Is a measure of the degree of convergence or divergence of light falling on it.
SI unit is Dioptre [D]
11. **Magnification:** Is the ratio of height of image to height of the object.
OR
Ratio of image distance to object distance.

12. **Lens formula:** $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

13. SIGN conventions:-

Convex lens	Concave lens
$f = +$	$f = -$
$u = -$	$u = -$
$v = +$	$v = -$
$m = \frac{v}{u}$	$m = \frac{v}{u}$

II. Answer the following:

1. State two laws of refraction of light.

- The incident ray, the refracted ray and the normal ray at the point of incidence, all lie in the same plane.
- The ratio of sine of angle of incidence to the sine of angle of refraction is constant. [Snell's law]

2. 'Refractive index of glass is 1.5', write the meaning of this statement.

It means the ratio of the speed of light in air [or vacuum] to the speed of light in glass is equal to 1.5.

3. Refractive indices of kerosene, turpentine and water are 1.44, 1.47 and 1.33 respectively. In which of these materials light travels faster?

Speed of light is faster [maximum] in that medium which has lowest refractive index. Hence it is water.

4. Refractive indices of four materials A, B, C, D are 1.33, 1.43, 1.71 and 1.52 respectively. In which of these materials, refraction of light is maximum?

Refraction is maximum in highest refractive index. Hence it is material 'C'

5. List out the nature, position and size of the image formed by Convex lens for various positions of the object.

Position of object	Position of the image	Size of the image	Nature of the image
Infinity	At F_2	Highly diminished	Real and inverted
Beyond $2F_1$	Between F_2 and $2F_2$	Diminished	Real and inverted
At $2F_1$	At $2F_2$	Same size	Real and inverted
Between F_1 & $2F_1$	Between $2F_2$	Enlarged	Real and inverted
At F_1	At infinity	highly enlarged	Real and inverted
Between F & O	On the same side of lens	Enlarged	Virtual and erect

6. List out the nature, position and size of the image formed by concave lens for various positions of the object.

Position of object	Position of the image	Size of the image	Nature of the image
At Infinity	At F_1	Highly diminished	Virtual and erect
Between infinity & O	Between F and O	Diminished	Virtual and erect

Note: To draw ray diagrams, in convex or concave lens, please note this 2 rays are drawn from object, in which one of them should pass through optic centre [O] and another ray through [F₁].

Practice ray diagrams please refer text book. (Definite 2-3 Mark Question)

Question:-

‘A convex lens produces image, where the size of the image is same as size of the object’. Draw ray diagram to represent this.

III. Numericals:

1. An object is placed at the following distances from a convex lens of focal length 10 cm.

a) 8 cm b) 15 cm c) 20 cm d) 25 cm.

Which position of the object will produce?

1. Diminished real image?
2. Magnified real image?
3. Magnified virtual image?
4. Image of the same size of the object.

Solution:- $f = 10 \text{ cm}$ $\therefore 2f = 2 \times 10$
 $2f = 20 \text{ cm}$

Diminished real image: Is formed beyond $2f$
 \therefore It is (d) 25 cm

Magnified real image [enlarged]: Is formed between f and $2f$
 \therefore It is (b) 15 cm

Enlarged virtual image: Is formed between f and O
 \therefore It is (a) 8 cm

Image size equal to object size: At ' $2f$ ', image is formed
 \therefore It is (c) 20 cm

2. Magnification of a spherical lens is +1.5, What is the:-

(a) Nature of image?

(b) Nature of lens.

Solution: Magnification is positive

(a) So Nature of image is virtual & erect

(b) Magnification more than 1 so image is larger than object. This is done by convex lens.

3. Magnification of a spherical lens is +0.7. What is the:

(a) Nature of image? (b) Nature of lens.

Solution: Magnification is positive

(a) Hence Nature of image is virtual & erect

(b) Magnification is less than 1, so image is smaller than object. Virtual, diminished, erect image is formed by convex lens.

4. Power of a lens is +2.5 D. What kind of lens it is and find its focal length.

Solution: Power of lens is positive. Hence it is Convex lens

$$p = \frac{1}{f} \quad \therefore f = \frac{1}{p} \quad f = \frac{1}{2.5} = \frac{1}{2.5} \times 100 \text{ cm} = 40 \text{ cm}$$

5. A convex lens of focal length 10 cm is placed at a distance of 12 cm from a wall. How far from the lens should an object be placed so as to form its real image as wall?

Solution: $f = 10 \text{ cm}$ $V = +12 \text{ cm}$ $u = ?$

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

$$\frac{1}{12} - \frac{1}{u} = \frac{1}{10}$$

$$\therefore \frac{1}{12} - \frac{1}{10} = \frac{1}{u}$$

$$\frac{10 - 12}{120} = \frac{1}{u}$$

$$\frac{-2}{120} = \frac{1}{u}$$

$$\therefore u = -60 \text{ cm}$$

6. An object is placed at a distance of 50 cm from a concave lens of focal length 20 cm. Find the position of image.

Solution: $f = -20 \text{ cm}$ $u = -50 \text{ cm}$ $v = ?$

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

$$\frac{1}{v} - \frac{1}{-50} = \frac{1}{-20}$$

$$\frac{1}{v} + \frac{1}{50} = -\frac{1}{20}$$

$$\therefore \frac{1}{v} = -\frac{1}{20} - \frac{1}{50}$$

$$\frac{1}{v} = \frac{-50 - 20}{1000}$$

$$\frac{1}{v} = \frac{-70}{1000} = \frac{-7}{100}$$

$$\therefore v = -\frac{100}{7} = -14.3 \text{ cm}$$

7. Two lenses of power +3.5 D and -2.5 D are placed in contact. Find the power and focal length of the lens combination.

Solution:

$$\begin{aligned} \text{Power} &= P_1 + P_2 \\ &= 3.5 + (-2.5) \\ &= 3.5 - 2.5 \end{aligned}$$

$$\mathbf{P = 1 D}$$

$$\therefore f = \frac{1}{p}$$

$$f = \frac{1}{1}$$

$$\mathbf{f = 1 m}$$

8. An object of 7 cm height is placed at a distance of 12cm from a convex lens of focal length 8 cm. Find (i) position ii) Nature iii) Height of image

Solution: - $f = +8 \text{ cm}$ $u = -12 \text{ cm}$ $V=?$ $h_o = 7 \text{ cm}$ $m = ?$ $h_i = ?$

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

$$\frac{1}{v} - \frac{1}{-12} = \frac{1}{8}$$

$$\frac{1}{v} + \frac{1}{12} = \frac{1}{8}$$

$$\therefore \frac{1}{v} = \frac{1}{8} - \frac{1}{12}$$

$$\frac{1}{v} = \frac{12 - 8}{96}$$

$$\frac{1}{v} = \frac{4}{96}$$

$$\therefore \mathbf{v = + 24 \text{ cm}}$$

‘+’ shows image is right side of lens.

$$\text{Magnification } m = \frac{v}{u} \Rightarrow m = \frac{24}{-12} = -2$$

Magnification is greater than 1

[So size of image is larger than size of the object '-' sign indicates image is formed below principal axis]

$$m = \frac{h_i}{h_o} \Rightarrow -2 = \frac{h_i}{7} \Rightarrow h_i = -14 \text{ cm}$$

Height of image is 14cm & negative sign shows image is below principal axis real and inverted.

Note: - please practise similar questions for more perfection.

Unit 10 : Electricity

TERMS AND DEFINITIONS

1. Electric current: Flow of electron in conductors.
2. Electric circuit : A continuous and closed path in which current flows.
3. One Ampere : The flow of one coulomb of charge per second.
It is a S.I. unit of current.
4. Ammeter : Is a device used to measure current.
5. Electric potential: Work done to move a unit charge from infinity to a point.
6. Potential difference: Work done to move unit charge from one point to another point in an electric field.
7. One volt: One joule of work done to move one coulomb of charge from one point to another point.
8. Resistance: The obstruction for the flow of electrons.
9. Factors on which resistance depends:
 - 1)Length of the conductor
 - 2)Area of cross section
 - 3)Nature of the material
10. **Ohm's law:** At constant temperature, the potential difference at the ends of the wire in an electric circuit is directly proportional to current flowing through it.
$$V=IR$$
11. Heating effect of electric current: When current flows through certain substances it produces heat. This is called heating effect of electric current.
12. Joule's law of heating: Heat produced in a resistor is directly proportional to 1)Square of the current 2)Resistance of the resistor 3)Time for which the current flows
$$H=I^2RT$$
13. Electric power: Rate at which electric energy is consumed in an electric circuit. SI unit is Watt.
14. 1 Watt: Power consumed by a device that carries 1A of current when operated at a potential difference of 1 Volt.

Important formulae

Some of the commonly used Electricity formulae are listed below.

Quantity	Formulas	Unit
Current I	$I = Q / t$ Q = Charge t = time taken	Amperes (A)
Voltage V	$V = E / Q$ or $V = W / Q$ E = Energy, W = Work done	Volts (V)
Resistance R	$R = \rho l / A$ ρ = Resistivity, l = length, A = Area or, $R = V / I$	Ohm (Ω)
Power P	$P = VI$	Watts (W)

Electricity MCQs (1 Mark)

1. A battery of 10 volt carries 20,000 C of charge through a resistance of 20 Ω . The work done in 10 seconds is

- (a) 2×10^3 joule
- (b) 2×10^5 joule
- (c) 2×10^4 joule
- (d) 2×10^2 joule

Answer - b

Explanation: (b) $W = qV = 20000 \times 10 = 2,00,000 = 2 \times 10^5$ J

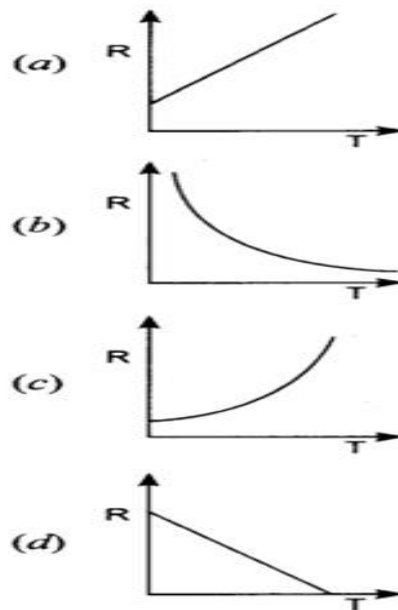
2. To get 2 Ω resistance using only 6 Ω resistors, the number of them required is

- (a) 2
- (b) 3
- (c) 4
- (d) 6

Answer - b

Explanation: (b) Three resistors of $2\ \Omega$ is required to get $6\ \Omega$ because resultant is more than individual so they all must be connected in series.

3. The temperature of a conductor is increased. The graph best showing the variation of its resistance is



Answer – A

Explanation: (a) Resistance is directly proportional to temperature of the conductor.

4. A boy records that 4000 joule of work is required to transfer 10 coulomb of charge between two points of a resistor of $50\ \Omega$. The current passing through it is

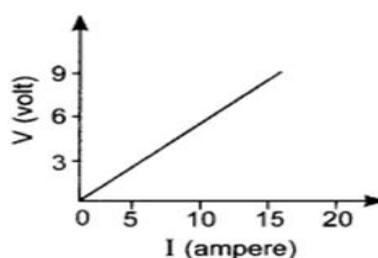
- (a) 2 A
- (b) 4 A
- (c) 8 A
- (d) 16 A

Answer - c

Explanation : (c) Work done in transferring the charge $W = qV = qIR$ ($V = IR$)

$$\Rightarrow I = \frac{W}{qR} = \frac{4000}{10 \times 50} = 8\text{ A}$$

5. The resistance whose V-I graph is given below is



(a) $\frac{5}{3} \Omega$

(b) $\frac{3}{5} \Omega$

(c) $\frac{5}{2} \Omega$

(d) $\frac{2}{5} \Omega$

$$\frac{9 - 0}{15 - 0} = \frac{9}{15} = \frac{3}{5} \Omega.$$

Answer - b

Explanation: (b) Resistance = slope line of V-I graph

Important Questions and Answers

1 Mark Important Questions

Q1. - Define electric potential.

Answer - Electric potential at a point in an electric field is defined as the work done in moving a unit positive charge from infinity to that point in the electric field.

Q2. - State the relation between work (W), change (q) and electric potential (V).

Answer - $V = W/q$.

Q3. - Define 1 volt electric potential.

Answer - Electric potential is said to be 1 volt if 1 Joule of work is done in moving 1 coulomb charge from infinity to a point in the electric field.

Q4. - Is electric potential a scalar or a vector physical quantity ?

Answer - Electric potential is a scalar physical quantity.

Q5. - What is meant by potential difference between two points ?

Answer - Work done per unit charge in moving a unit positive charge from one point to another point in an electric field is called potential difference between two points.

Q6. - State the relation between the current I passing in a conductor, number of electrons (n) flowing through any cross-section of the conductor, magnitude of charge on an electron (e) and time t.

Answer - $I = ne/t$.

Q7. - Define 1 ampere electric current.

Answer - Electric current through a conductor is said to be 1 ampere if 1 coulomb electric charge flows through a cross-section of a conductor in 1 second.

Q8. - How is the direction of electric current related to the direction of flow of electrons in a wire ?

Answer - The direction of electric current in a wire is just opposite to the direction of flow of electrons in the wire.

2 Marks Important Questions

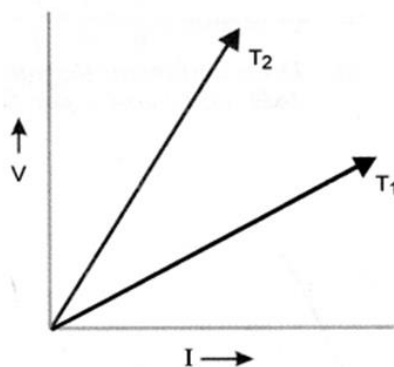
Q1. - State the law that gives the relationship between the potential difference (V) across the two ends of a conductor and the current (I) flowing through it.

Answer - Ohm's law states that the electric current flowing through a conductor is directly proportional to the potential difference across the ends of the conductor, provided the temperature and other physical conditions of the conductor remain the same.

Q2. - The voltage - current (V-I) graph of a metallic circuit at two different temperature T₁ and T₂ is shown. Which of the two temperatures is higher and why ?

Or

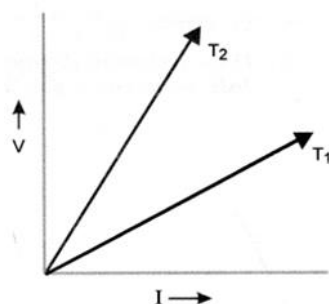
The voltage-current (V-I) graph of a metallic conductor at two different temperatures T₁ and T₂ is shown in figure. At which temperature is the resistance higher?



Answer - Slope of I-V graph = resistance of metallic conductor.

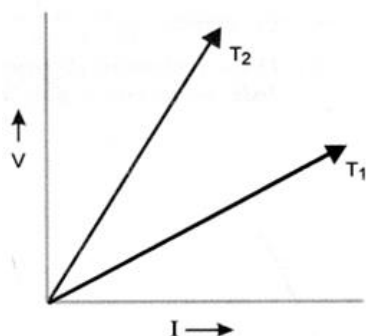
Since, slope of I-V graph at temperature T₂ is greater than the slope of I-V graph at temperature T₁, therefore, resistance at T₂ is greater than resistance at T₁. Since, resistance of a metallic conductor increases with increase in temperature, therefore,

T₂ > T₁



Q3. - How does the resistance of a wire vary with its cross-section area?

Answer - Resistance of a wire is inversely proportional to its cross-sectional area. More is cross-sectional area of a conductor, less is the resistance of the conductor.



Q4. - State Joule's law of heating.

Answer - According to Joule's law of heating, the amount of heat produced in a conductor is directly proportional to the square of electric current passing through the conductor, directly proportional to the resistance of the conductor, and directly proportional to the time for which electric current passes through the conductor.

Q5. - List two differences between a voltmeter and ammeter.

Answer -

Ammeter	Voltmeter
1. Ammeter measures electric current in the circuit. 2. Ammeter is connected in series in an electric circuit.	1. Voltmeter measures the potential difference between two points on a conductor. 2. Voltmeter is connected in parallel across the ends of a conductor or resistor.

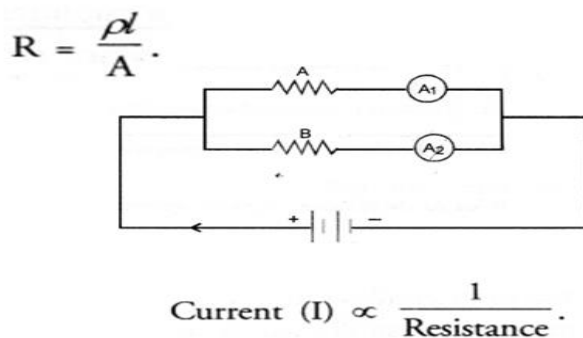
Q6. Two wires, one of copper and other of manganin, have equal lengths and equal resistances. Which wire is thicker ? Given that resistivity of copper is lower than that of manganin.

Ans - Since l and R of both the wires are same, so $A \propto \frac{1}{\rho}$. Since, resistivity (ρ) of manganin is higher than that of copper, so manganin wire is thicker than that of copper wire.

$$\text{We know, } R = \frac{\rho l}{A} \text{ or } A = \frac{\rho l}{R}$$

Q7. - In the circuit diagram shown, the two resistance wires A and B are of the same length and same material, but A is thicker than B. Which ammeter A₁ or A₂ will indicate higher reading for current ? Give reason.

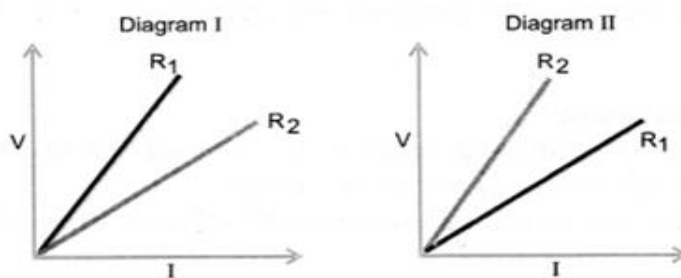
Answer - The current will be high if resistance is low. ρ and l for both wires A & B are same but area of cross-section (A) of wire A is- more than the wire B. Therefore, the resistance of wire A is less than the resistance of wire B. Hence, ammeter A connected in series with the wire A will indicate higher reading for current.



Q8. - Two students perform experiments on two given resistors R₁ and R₂ and plot the following V-I graphs. If R₁ > R₂, which of the two diagrams correctly represent the situation on the plotted curves ? Justify your answer.

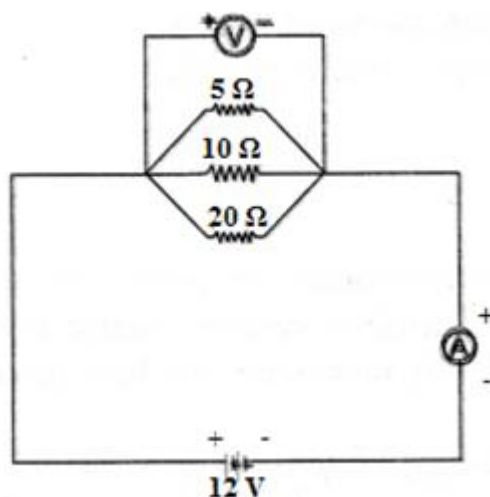
Answer - Resistance of a conductor = slope of I-V graph. It means, resistance is high if slope of I-V graph for it is steeper.

Since R₁ > R₂, therefore, slope of I-V graph for R₁ must be steeper than the slope of I-V graph for R₂. Thus, diagram I represents the situation correctly.



Q9. - Draw a schematic diagram of a circuit consisting of a battery of 12V, three resistors of 5Ω, 10Ω and 20Ω connected in parallel, an ammeter to measure the total current through the circuit, voltmeter to measure the potential difference across the combination of resistors. [CBSE (All India) 2008]

Answer -



Q10. (a) Why an ammeter likely to burn out if you connect it in parallel ?

(b) Why is series arrangement not found satisfactory for domestic lights

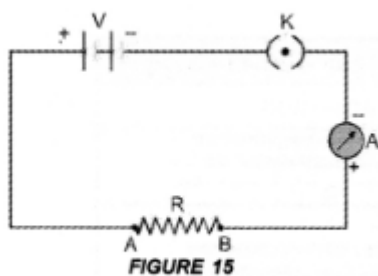
Answer - (a) Ammeter is a low resistance device. If it is connected in parallel, a large current flows through it. Hence, large heat is produced and it may burn the ammeter.

(b) If domestic lights are connected in series, then all lights will be switched off even when only one light fuses.

5 Mark Important Questions

Q1 - Describe an experiment to study the factors on which the resistance of a conductor or a conducting wire depends.

Ans - For Experiment: Connect the various electrical components as shown in figure 15.



Dependence of Length of a Conductor:

Take a copper wire of length l and connect it between the terminals A and B. Note the reading of ammeter. Now take another copper wire of same area of cross-section but of length $2l$. Connect it between the terminals A and B by disconnecting the previous wire. Again, note the reading of ammeter. It will be found that the reading of ammeter (i.e., electric current) in the second case is half of the reading of ammeter in the first case.

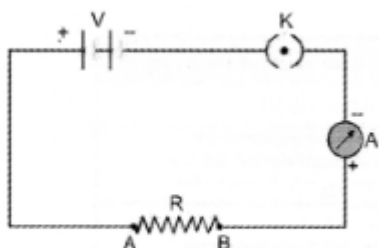


FIGURE 15

Thus, resistance of a conductor is directly proportional to the length of the conductor, i.e. $\text{resistance} \propto \text{length}$ of the conductor.

Thus, more is the length of a conductor, more is its resistance. Thus, the resistance of a conductor is 'inversely proportional to the area of cross-section of the conductor.

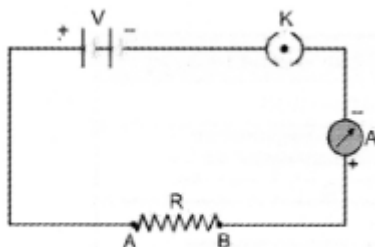


FIGURE 15

Dependence on area of Cross-Section of a Conductor:

Now take two copper wires of same length but of different area of cross-sections. Let area of cross-section of first wire is more than the area of cross-section of the second wire. Connect first wire between the terminals A and B in the circuit shown in figure

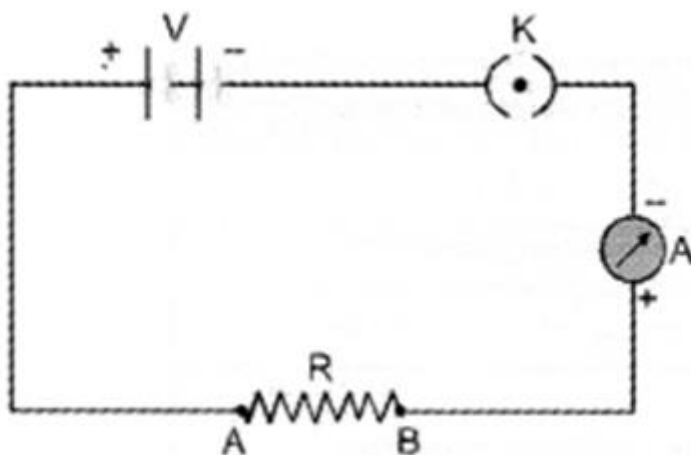


FIGURE 15

1. Note the reading of ammeter :

Now disconnect the first wire and connect the second wire between the terminals A and B. Again note the reading of the ammeter. It will be found that the reading of ammeter (i.e. electric current) is more when first wire (i.e. thick wire) is connected between A and B than the reading of the ammeter when second wire (i.e. thin wire) is connected between the terminals A and B.

Thus, the resistance of a thin wire is more than the resistance of a thick wire.

2. Effect of the Nature of Material:

Take two identical wires, one of copper and other of aluminium. Connect the copper wire between the terminals A and B.

3. Note the reading of ammeter. Now, connect the aluminium wire between the terminals A and B. Again note the reading of ammeter.

4. It is found that the reading of ammeter when copper wire is connected in the circuit is more than the reading of the ammeter when aluminium wire is connected in the circuit. Therefore, resistance of copper wire is less than the resistance of aluminium wire. Hence, resistance of a wire or a conductor depends upon the nature of the material of the conductor.

3. Effect of Temperature of Conductor:

If the temperature of a metallic conductor connected in the circuit increases, its resistance increases.

Thus, factors on which resistance of a conductor depends are:

1. its length,
2. its area of cross-section,
3. the nature of its material and
4. its temperature.

$$\text{i.e.,} \quad \text{resistance} \propto \frac{1}{\text{area of cross-section of the conductor}}$$

$$\text{or} \quad R \propto \frac{1}{A}$$

Q2. - What is Joule's heating effect? List applications of Joule's heating effect in daily life.

Answer –

Joule's law can be stated as : The amount of heat produced in a conductor is (i) directly proportional to the square of the electric current flowing through it.

This is $H \propto I^2$ -

(ii) directly proportional to the resistance of the conductor or resistor.

That is, $H \propto R$ ‘

(iii) directly proportional to the time for which the electric current flows through the conductor or resistor.

That is, $H \propto t$

Combining (i), (ii) and (iii), we get $H \propto I^2 R t$.

This is known as Joule's law of heating.

- **Four Applications:**

When electric appliances like electric heater, electric iron and water heater etc. are connected to the main supply of electricity, these appliances become hot but the connecting wires remain cold.

We know, the heat produced is directly proportional to the resistance of the material through which current flows. The element of the electric heater is made of nichrome. Since the resistance of nichrome is high, so a large amount of heat is produced in the element of the electric heater. However, heat produced in connecting wires made of copper or aluminium is very small and hence they are not heated up.

- The filament of an electric bulb is made of a thin wire of tungsten. The melting point of filament is high i.e., about 3380°C . The filament of the bulb is enclosed in a glass envelope fixed over insulated support as shown in figure 28. The glass envelope of the electric bulb is filled with inactive gases like nitrogen and argon to increase the life of the tungsten filament.

Since the resistance of the thin filament is very high, so a large heat is produced as the electric current flows through the filament. Due to this large amount of heat produced, the filament of the bulb becomes white-hot. Hence, the filament of the bulb emits light and heat.

- An electric fuse is a safety device connected in series with the electric circuit. An electric fuse is a wire made of a material whose melting point is very low. Examples of the materials of making fuse wires are copper or tin-lead alloy. When a large current flows through a circuit and hence through a fuse wire, a large amount of heat is produced. Due to this large amount of heat, the fuse wire melts and the circuit is broken so that current stops flowing in the circuit. This saves the electric circuit from burning due to the passage of a large current through it.

GIVE REASONS

1. Tungsten is used for filament of electric lamps.

Ans : Because of very high melting point, high flexibility and low rate of evaporation at high temperature.

2. Series arrangement is not used for domestic circuits.

Ans : 1) one device stops working, all other devices stops.

2) all devices are connected to one switch by which they cannot be operated independently.

3 Copper and aluminium wires are employed for electricity transmission.

Ans: because they have low resistivity due to which they are good conductors of electricity.

IMPORTANT CIRCUIT DIAGRAMS.

1. Closed circuit
2. Ohm's law
3. symbols of components in electric circuits.

Please refer textbook

Note: Practice similar type of questions for MCQ and Numerical for more perfection.

Unit 11 : Magnetic Effects of Electric C

I. Terms and Definitions

1. **Magnetic Field:** The area around a magnet where its effect can be felt.
2. **Magnetic field lines:** Imaginary lines of force that exists between poles of magnet
3. **Properties of lines of force:**
 - They never intersect each other.
 - They start from N-pole and end at S-pole.
 - They are closed curves.
4. **Right hand thumb rule:** Imagine that a current carrying straight conductor is held in right hand such that thumb points towards direction of current, then the fingers around the conductor shows the direction of magnetic field lines.
5. **Electromagnetic Induction:** The process by which a changing magnetic field induces a current in another conductor is called electromagnetic induction.
6. **Electric generator:** A device that converts mechanical energy into electrical energy.
7. **Electric motor:** A device that converts electrical energy to mechanical energy.
8. **Over loading & Short circuit:** can occur when live wire and neutral wire comes in direct contact. Then current increases abruptly. This is called short circuiting.
9. **Fleming's right hand rule:** Hold the forefinger, central finger and thumb of right hand perpendicular to each other such that, forefinger indicates the direction of magnetic field, thumb shows the direction of motion of conductor, then central finger shows the direction of current induced.
10. **Fleming's left-hand rule:** Hold the forefinger, central finger and thumb of left hand perpendicular to each other, such that, forefingers indicates the direction of magnetic field, central finger indicates direction of current, then thumb shows the direction of motion of conductor.
11. **Fuse:** Is a safety device made up of alloy of lead and tin. When excess current flows in the circuit, fuse melts and breaks the circuit.

12. Direct current:

- Always flows in same direction
- Is used for electricity in automobiles
- Positive and negative polarity is fixed

13. Alternate current:

Current changes its direction in every half cycle

Used for domestic and industrial purpose

Positive and negative polarity is not fixed

14. Solenoid: A coil of many circular turns of wire wrapped in the shape of cylinder is solenoid.

15. Electromagnets: Temporary magnets made up of soft iron wrapped around with a coil of insulated copper wire.

16. Domestic wiring: We receive AC electric power of 220V. 2 wires are live and neutral wire. Third wire is Earth wire connected to metallic body inside earth.

17. Galvanometer: Is a device used to detect the presence of current in a circuit.

18. Working principle of motor: A conductor carrying current kept in a magnetic field experiences mechanical force.

19. Working principle of generator: Whenever magnetic field linked with circuit changes it induces current.

20. Commutator: A devices that reverses the direction of flow of current in the circuit.

II. Important Diagrams:

1. Magnetic field due to a current through straight conductor.
2. Electric motor
3. Electric generator

Please refer textbook for diagrams.

III. Practical based questions:

1. How do you determine magnetic field lines around a bar magnet using compass needle?

- Take a bar magnet and place it on a white sheet and mark its boundary.
- Place the compass near North Pole of magnet.
- Mark the position of two ends of needle.
- Move the needle to new position such that South Pole occupies the position previously occupied by North Pole.
- Repeat this until we reach South Pole of magnet.
- Join the points marked on paper by smooth curve.
- This curve represents field lines.

2. Two circular coils A and B are placed close to each other. If the current in coil A is changed will current be induced in B?. Give reason.

- When we switch on current in coil A, it becomes electromagnet and produces magnetic field around B.
- Hence induced current flows in B.
- When we switch off current in coil A, then magnetic field in coil B stops quickly. So induces current flows in B, but in opposite directions.

3. Can you determine North and South Pole of current carrying solenoid using bar magnet? Explain.

- One end of current carrying solenoid acts like N-pole and other end acts as S-pole so when it is suspended freely, it comes to rest in N-S.
- Bring N-pole of a bar magnet near both the ends of freely suspended solenoid.
- The end of solenoid repelled by North pole of bar magnet moves away from it, and thus is North pole.
- End of solenoid which will be attracted by North pole is South pole of solenoid.

4. How are electromagnets prepared?

- An electromagnet is a temporary magnet consisting of a long coil of insulated copper wire wrapped around soft iron core.
- When current is passed through this it gets magnetised.
- Soft iron core itself gets magnetized due to flow of current.
- When flow of current stops, it loses magnetism.
- Hence electromagnets are temporary magnets.
-

5. Explain Faradays experiment to show moving magnet can be used to generate electric current.

- Take a coil of wire with number of turns and connect it to ends of galvanometer.
- Take a strong bar magnet and move its N-pole inside the coil, then galvanometer shows deflection due to flow of current.
- Remove the magnet from the coil, galvanometer shows deflections in opposite direction.
- When both magnet and coil are at rest, no deflection is observed.
- Hence magnetism produces electricity.

Unit 12 : Sources Of Energy

I TERMS AND DEFINATIONS:

1. **Fuel:** - A substance that produce heat and light on combustion.
2. **Features of a good fuel:**
 - a. Be easily available.
 - b. Be easy to store & transport
 - c. Should not produce much smoke.
3. **Biogas:** Is a mixture of gases produced during decay of biomass in the absence of oxygen.
4. **Renewable sources:** Those sources of energy which are being produced continuously and are inexhaustible.
5. **Non Renewable sources:** Those sources of energy which cannot be quickly replaced when exhausted are called Non-renewable.
6. **Calorific value:** Heat liberated in joule on complete burning of one gram of a fuel is its calorific value.

II. Answer the following questions

1. Explain the formation of biogas.

- a. A slurry of cow dung and water is mixed in tank and fed to digester.
- b. Due to anaerobic fermentation, it helped in decomposition of cow dung slurry.
- c. Due to decomposition, it generates gases like methane, carbon dioxide, hydrogen and hydrogen sulphide.
- d. The biogas is stored in gas tank above the digester from which they are drawn through pipes for use.

[for biogas plant diagram, please refer text]

2. 'Biogas is a boon to farmers' – Justify.

The slurry left behind and can be used as excellent manure.

3. Write the characteristics features of a biogas.

- It burns without smoke
- It leaves no residue like ash
- It's heating capacity is high.

4. What is wind energy?

The energy obtained by moving air is called wind energy.

5. How is electricity generated using windmill?

- To generate electricity, the rotatory motion of the windmill is used to turn the turbine of the electric generation.
- The output of a single windmill is less. Hence a number of windmills are erected over a large area.
- The energy output is coupled together to get electricity on a large scale.

6. Wind energy is environmental friendly' – Substantiate.

- It requires no expenses for the production of electricity.
- It is efficient source.

7. 'Even though wind energy is eco-friendly it has its own limitations.' Support this statement with reasons.

- Wind energy is not constant throughout the day.
- There should be some backup facilities to take care of energy needs.
- Establishment of wind energy farms requires larger area of land.
- Tower and blades need high level of maintenance.

8. What is a Solar Cooker?

Solar Cooker is a device which is used to cook food by utilising the heat energy radiated by the sun.

9. Give reasons:

- i) Solar Cooker is painted black inside. Black surface absorbs more heat. This heat is used to cook food.
- ii) Solar Cooker has thick glass sheet cover over the box. The sun's heat rays pass through glass sheet cover and get absorbed by the black inside surface of the box. So heat gets trapped inside and temperature rises to cook food.

10. What is a Solar cell ?

Solar cell is a device that converts solar energy to electricity.

11. What is a Solar panel?

A large number of solar cells joined together in a definite pattern is called solar panel.

12. 'Even though Solar cells are very expensive, yet their use must be encouraged.' Justify.

Use of Solar cells must be encouraged because they have lot of advantages like

- They have no moving parts.
- They require little maintenance.
- They can be set up in remote areas also.

13. List out the uses of Solar cells.

- used for providing electricity in artificial satellites and space probes.
- used for transmission of radio and television programmes in remote areas
- used for operating traffic signals, watches, calculators

14. What is tidal energy? How can it be harnessed?

Due to gravitational force between moon and the earth, level of water rises and falls in the sea. These are called tides and the energy obtained from this is called Tidal energy.

It is harnessed by constructing dam across sea. A turbine fixed at dam converts tidal energy to electricity.

15. 'Tidal energy is not likely to be a potential source of energy in future.' Why?

This is due to following reasons,

- There are very few sites around the World and suitable for building tidal dams.
- Rise and fall of sea water is not enough to generate electricity on a large scale.

16. What is Ocean thermal energy?

The energy available due to difference in the temperature of water at the surface of the ocean and at deeper levels is called ocean thermal energy.

17. What is Geo thermal energy?

It is the heat energy from hot rocks present inside the earth.

18. What is Nuclear energy?

The energy released during a nuclear reaction is called Nuclear energy.

19. What is a Nuclear reactor?

It is a device that uses self-sustained chain reaction and convert nuclear energy to electricity.

Unit 13 : Sources Of Energy

I. Answer the following questions :

1. Why is ozone layer getting depleted at the higher levels of the atmosphere?

Answer. Ozone layer is getting depleted at the higher levels of the atmosphere due to effect of chlorofluorocarbons (CFC_s) which are used as refrigerants and in fire extinguishers.

2. Which disease is caused in human beings due to depletion of ozone layer in the atmosphere?

Answer. Skin cancer is caused in human beings due to the depletion of ozone layer in the atmosphere.

3. How is ozone formed in the upper atmosphere? Why is the damage of ozone layer a cause of concern to us? State a cause of this damage.

Answer. Ozone is formed in upper atmosphere by the reaction of ultraviolet (UV) radiations on oxygen (O₂) molecule.

The damage to ozone layer is a cause of concern to us as due to its damage, more ultraviolet rays reach the earth's surface causing various health hazards.

A cause of this damage is the presence of large amount of chlorofluorocarbons in the atmosphere.

4. State two problems caused by the non- biodegradable waste that we generate in our daily life.

Answer. Two problems caused by non-biodegradable waste that we generate in our daily life are:

- * It clogs drains.
- * It causes water and soil pollution.

5. What are biodegradable and non- biodegradable substances? Select two biodegradable pollutants from the following: Agricultural waste, glass, plastic, sewage, DDT.

Answer. Biodegradable substances are those substances which are broken down into simpler, harmless substances in nature in due course of time by the biological processes such as micro organisms like certain bacteria.

Non-biodegradable substances are those substances which cannot be broken down into simpler, harmless substances in nature.

Two biodegradable pollutants are agricultural waste and sewage.

6. “Damage to the ozone layer is a cause for concern.” Justify this statement. Suggest any two steps to limit this damage. ‘

Answer. Ozone layer prevents the harmful ultraviolet radiation to enter the atmosphere and reach the earth’s surface. Depletion of ozone layer has become a cause for concern because it can cause serious effects on human body and other organisms of the environment like fatal diseases such as skin cancer, changes in genetic material DNA, eye damage, etc.

Two steps to limit this damage are as follows:

- * Judicious use of aerosol spray propellants such as fluorocarbon and chlorofluorocarbons which cause depletion or hole in ozone layer.
- * Control over large scale nuclear explosions and limited use of supersonic planes.

7. Why did United Nations act to control the production of chlorofluorocarbons (CFCs) used in refrigerators?

Answer. CFCs deplete the ozone layer around the earth, hence their production is controlled by United Nations

8. Which compounds are responsible for the depletion of ozone layer?

Answer. The compounds responsible for the depletion of ozone layer are chlorofluorocarbons (CFCs).

9. Which class of chemicals is linked to the decrease in the amount of ozone in the upper atmosphere of the earth?

Answer. The chemical compound Chlorofluorocarbon is responsible for decrease of ozone in the upper atmosphere of the earth.

10. Select two non-biodegradable substances from the following waste generated in a kitchen: spoilt food, paper bags, milk bags, vegetable peels, tin cans, used tea leaves.

Answer. Milk bags and tin cans.

11. Write the name and formula of a molecule made up of three atoms of oxygen.

Answer. Ozone and its chemical formula is O_3 .

Unit 14 : SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES

I Answer the following questions :

1. What are natural resources?

- The resources which are available in nature and are useful to mankind are called natural resources.

2. What is sustainable management of Natural Resources?

- Sustainable management of Natural Resources is defined as using natural resources in a way and at a rate that maintains and enhances the resilience of ecosystem and the benefits they provide.

3. What is water harvesting?

- Rainwater harvesting is the collection and storage of rain rather than allowing it to run off.

4. Name the concepts of cultural landscape responsible for the conservation of Natural Resources.

- Sacred forests and grooves
- Sacred corridors and
- variety of ethno Forestry practices

5. Why did Government of India has instituted and Amrita Devi Bishnoi National award for wildlife conservation?

- In memory of Amrita Devi Bishnoi who sacrificed her life with 363 others in 1731 for the protection of khejri trees in Khejrli village near Jodhpur in Rajasthan.

6. What are the problems of constructing large dams?

- Social problems
- Economical problems
- Environmental problems

7. Mention 5R's to be followed in the conservation of Natural Resources.

- Refuse, Reduce, Reuse, Repurpose, Recycle.

8. Who are the stakeholders of forest produce?

- The people who live in and around the forest.
- The forest Department.
- The individualists
- The wildlife and nature enthusiasts

9. Why should we conserve forest and wild animals?

- Forests are biodiversity hotspots.
- Forest improve the economy of the country they prevent soil erosion and keep the environment cool.
- Wildlife increase the beauty of the environment and maintain ecological balance.

10. What are the advantages of water harvesting?

- Recharge the groundwater beneath.
- Water stored in the ground does not evaporate but spreads out to recharge wells and provides moisture for vegetation around a wide area.
- It does not provide breeding grounds for mosquitoes like stagnant water collected in ponds are artificial Lakes.
- Protect groundwater from contamination by human and animal waste

11. Give some instances of involvement of local people in the management of forest.

- Amrita Devi Bishnoi who sacrificed her life with 363 others in 1731 for the protection of khejri trees in Khejrli village near Jodhpur in Rajasthan.
- The chipko andolan started in the remote Village called Reni in Gharhwal high up in the Himalayas during the early 1970s.
- In 1972 the West Bengal Forest Department recognized its failure in reviving the degraded Sal forests in the South Western District of the state.

12. List some ancient water harvesting methods used in different regions of our country

- Rajasthan. Khadins, tanks and nadis
- Maharashtra -Bandhars and tals.
- Madhya Pradesh and Uttar Pradesh- Bundhis
- Bihar- Ahars and Pynes.

- Himachal Pradesh -Kulhs
- Jammu – ponds
- Tamil Nadu -Aris
- Kerala -Sarangums
- Karnataka- kattas

13. Forests are biodiversity hotspots explained.

- Measure of the biodiversity of an area is the number of species found there.
- The range of different life forms bacteria fungi ferns flowering plants nematodes insects birds reptiles and so on found there, so they are called biodiversity hotspots.

14. Reuse is better than recycling. How?

- The process of recycling uses some energy, but in reuse strategy, we simply use things again and again. E
- Example- instead of throwing away used envelopes, you can reverse it and use it again
- Jam and pickle bottles can be used for storing things in the kitchen.

15. What are the two main goals of Ganga Action Plan?

- To improve the quality of the river water.
- To control the growth of the disease-causing microbes to prevent water pollution by the effluence of factories.

RESOURCE TEAM MODEL PAPER – 1

DDPI Office, Bangalore North

Subject : SCIENCE

hrs. 15 minutes

Subject Code : 83E Time : 3

Max. Marks : 80

English Medium

Regular Fresh CCERF

Part : A

PHYSICS

I Four alternatives are given for each of the following questions / incomplete statements. Choose the correct alternative and write the complete answer along with its letter of

alphabet :-

3 x 1

=3

1. The SI unit of electric current is _____.

a) Ohm

b) Ampere

c) Volt

d) Coulomb

2. A soft iron bar is inserted inside a current-carrying solenoid. The magnetic field inside the solenoid _____.

a) Will decrease

b) Will become zero

c) Will increase

d) Will remain the same

3. An object is placed 20cm from a convex lens of focal length 10cm. The image must be

a) Real and diminished

b) Real and of same size

c) Real and enlarged

d) Virtual and enlarged

II Answer the following questions:-

2 x 1 = 2

4. Find the power of a concave lens of focal length '2m'.

5. The refractive indices of crown glass and flint glass are 1.52 and 1.65 respectively. Which will allow the light to travel faster? Give reason.

III Answer the following question:-

3 x 2 = 6

6. Draw a ray diagram to show the formation of the image of an object placed between

F_1 and $2F_1$ of a thin concave lens.

7. Electrical resistivities of some substances at 20°C are given below.

- Silver – 1.62×10^{-8} ohm metre
- Copper – 1.62×10^{-8} ohm metre
- Mercury – 94.0×10^{-8} ohm metre
- Tungsten – 5.20×10^{-8} ohm metre
- Nichrome – 100×10^{-6} ohm metre

Answer the following questions in relation to them.

- i) Among silver and copper, which one is a better conductor? Why?
- ii) Which material would you advise to be used in electrical heating devices?

8. Study the following circuit and answer the questions that follow.

- a) How much current is flowing through
 - i) 10 ohm and through
 - ii) 15 ohm resistors
- b) What is the ammeter reading?

IV Answer the following questions :-

3 x 3 = 9

9. Draw the diagram of an electric motor label the following parts.

- i) Brushes
- ii) Split rings

10. A convex lens forms a real and inverted image of a needle at a distance of 50cm from it.

Where is the needle placed in front of the convex lens if the image is equal to the size of the object? Also, find the power of the lens.

[OR]

An object is kept at a distance of 40cm from a diverging lens of focal length 20cm. At what distance the image is formed from the lens? Find the magnification of the image.

11. What are the major constituents of biogas? How is it obtained from animal or plant wastes? What are the advantages of this plant?

12. a) State Ohm's law mention the factors on which the resistance of a conductor depends. b) State Joule's law of heating and write the mathematical formula of this law.

13. What are magnetic field lines? How is the direction of a magnetic field at a point determined ? Mention 2 important properties of the magnetic field line.

OR

a) What are direct and alternating current (A.C) ? Why is alternating current preferred over direct current (D.C)?

b) Give some differences between electric motor and generator.

Part : B
CHEMISTRY

VI Four alternatives are given for each of the following question / incomplete statements Choose the correct alternative and write the complete answer along with its letter of alphabet.

3x1=3

14. Methyl orange is

- a) Pink in acidic medium , yellow in basic medium.
- b) Yellow in acidic medium , pink in basic medium.
- c) Colourless in acidic medium , pink in basic medium.
- d) Pink in acidic medium , colourless in basic medium.

15. The IUPAC name of $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2$ is

- a) 3-Butene
- b) Prop-1-ene
- c) But-1-ene
- d) Butyne

16. What happens to the electropositive character of elements on moving from left to right in a periodic table?

- a) Increase
- b) First increase then decreases
- c) Decreases
- d) First decreases then increase

VII Answer the following questions:

3x1=3

17. Why are aqueous solution of Ionic compounds able to conduct electricity?

18. Lithium , sodium and potassium were put in on group or triad on the basic of their similar properties. What is the name of this group? State any one property of it.

19. How will you test for the gas which is liberated when hydrochloric acid reacts with an active metal?

VIII Answer the following questions:-

3 x 2 =

6

20. Differentiate between saturated and unsaturated hydrocarbons. Giving one example each.

OR

Explain combustion reaction of carbon compounds with an example.

21. Draw the diagram of the apparatus used in the electrolytic refining of copper-label the following parts.

i) Cathode

ii) Anode mud

22. Why is a metal oxide called a basic oxide ? Name the products obtained when copper oxide reacts with dilute hydrochloric acid?

IX Answer the following question:-

3 x 3 =9

23. Explain the limitation of Mendeleev's periodic table?

OR

Explain the limitations of Newland's law of Octaves.

24. Draw the diagram of the arrangement of the apparatus showing the reaction of zinc granules with dilute sulphuric acid and testing hydrogen gas by burning . Label the following parts:

i)Zinc granules

ii) Delivery tube

25. What is cinnabar ? How is metal extracted from cinnabar ? Explain briefly.

X Answer the following questions:-

1 x 4 = 4

26. a) Write the electron dot structure for sodium and chlorine.

b) Show the formation of NaCl by the transfer of electrons with electron dot structure.

c) Name the ions present in the compound.

**Part : C
BIOLOGY**

XII. Four alternatives are given for each of the following questions/ incomplete statements. Choose the correct alternative and write the complete answer along with its respective letter of alphabet. (2X1=2 marks)

27. The group of materials which contain at least one biodegradable material is,

A. peels of vegetables, paper, leather belt.

B. cake, milk packet, wooden sticks.

C. grass, used tea leaves, paper bags.

D. pencil peels, silk saree, old books.

2) The pattern of response in the shoots of plants is,

A. upward directional and negatively phototropic.

B. positively phototropic and negatively geotropic.

C. non directional and positively geotropic.

D. positively hydrotropic and upward directional.

XII. Answer the following questions. (2X1=2 marks)

29. Why is it compulsory for refrigerator manufacturing companies to produce CFC-free fridges?

30. Name the ancient methods of rain water harvesting systems used in the states Kerala and Rajasthan in India.

XIV. Answer the following questions. (3X2=6 marks)

31. How does deoxygenated blood in the human body get oxygenated and supplied to different parts of the body?

31. Explain the role of transpiration in the conduction of water in plants.

32. Name any two protests carried out by local people to save the forest in India. Explain any one such protest.

33. Draw the diagram showing germination of pollen on stigma and label the part 'which receives male gamete'.

XV. Answer the following questions. (3X3=9 marks)

34. State and Prove the 'law of dominance' given by Mendel taking the example of the cross between round seeded (RR) Peas plants with wrinkled seeded(rr) peas plants.

35. In female reproductive system,

i) Where does the fertilization take place?

ii) What are the roles of ovary?

iii) If there is no fertilization what happens to the egg? How is it eliminated from the body?

OR

In sexual reproduction, (a) Name the cell division which helps to get the DNA amount to its half in germ cells. After fertilization what is the DNA amount in the zygote? What is the use of this process?

b) Differentiate between male and the female germ cells in human beings.

36. Draw the diagram showing the structure of nephron and label the following parts.

XVI. Answer the following questions: (2 X 4 = 8 marks)

37. a) Write the differences between homologous organs and analogous organs in different organisms with suitable examples.

38. a) Name the hormone which protects the body in dangerous situation? Explain its working mechanism during the emergency situation?

b) Write any four functions of the fore brain. Name the part of the fore brain which controls The hunger and sleep.

RESOURCE TEAM MODEL PAPER – 2

DDPI Office, Bangalore North

Subject : SCIENCE

Subject Code : 83E

Time : 3 hrs. 15 minutes

Max. Marks : 80

English Medium

Regular Fresh CCERF

Part : A

PHYSICS

I. Four alternatives are given for each of the following questions/incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet .

3 x 1 = 3

1. Images formed in concave lens are

- a. Real and inverted
- b. Virtual and inverted
- c. Virtual and erect
- d. Real and erect

2. S.I Unit of Electric power is

- a. Watt
- b. Ohm
- c. Joule
- d. Volt

3. Magnetic field lines around straight conductor are----- in nature

- a. Perpendicular in nature
- b. Parallel in nature
- c. Elliptical in nature
- d. Circular in nature having common centre .

II. Answer the following questions:-

2 x 1 = 2

4. State Snell's law of refraction.
5. Magnetic field is called as vector quantity. Why?

III. Answer the following questions:-

3 x 2 = 6

6. Draw a circuit diagram to verify Ohm's law?
7. The refractive index of water is 1.33 and the speed of light in air is $3 \times 10^8 \text{ ms}^{-1}$. Calculate the speed of light in water.
8. Define 1 volt. Express it in terms of SI unit of work and charge calculate the amount of energy consumed in carrying a charge of 1 coulomb through a battery of 3 V.
Ans:- When 1 joule of work is done in carrying 1 coulomb of charge, from infinity to a point in the electric field, then potential at that point is called 1 volt. Potential difference between two points is

IV. Answer the following questions:-

3 x 3 = 9

9. Draw the diagram of electric generator and label any two parts.
10. A concave lens has focal length of 20 cm. At what distance from the lens a 5 cm tall object be placed so that it forms an image at 15 cm from the lens? Also calculate the size of the image formed.

OR

At what distance should an object be placed from a convex lens of focal length 18 cm to obtain an image at 24 cm from it on the other side. What will be the magnification produced in this case?

11. Bio gas is an excellent fuel. Justify the statement by giving two reasons. Answer.
(i) It burns without smoke and leave no residue therefore causes no atmospheric pollution.
(ii) Its heating capacity is high, i.e. it has high calorific value. Main constituents of bio gas: The composition of bio gas varies depending upon the nature of organic matter feeding in the digester and advanced waste treatment technology.

V. Answer the following questions:-

2 x 4 = 8

12. What is meant by electric current? Name and define its SI unit. In a conductor electrons are flowing from B to A. What is the direction of conventional current? Give justification for your answer.

OR

Two identical wires one of nichrome and other of copper are connected in series and a current (I) is passed through them. State the change observed in the temperatures of the two wires. Justify your answer. State the law which explains the above observation.

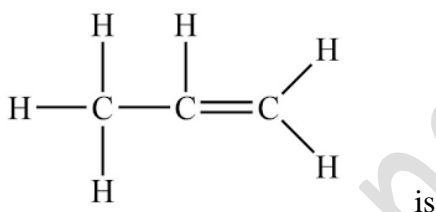
13. A coil of insulated copper wire is connected to a galvanometer. What will happen if a bar magnet is (a) pushed into the coil,
(b) withdrawn from inside the coil,
(c) held stationary inside the coil?

Part : B

CHEMISTRY

VII. Four alternatives are given for each of the following questions / incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet 2X1=2

14. The name of carbon compound



- | | |
|------------|--------------|
| A. Propyne | B. propanone |
| C. propane | D. propene |

15. The process of burning the carbonate ores into oxides by heating strongly in limited air is known as _____

- | | |
|-----------------|--------------|
| A. Electrolysis | B. Roasting |
| C. Calcination | D. oxidation |

VIII. Answer the following questions 4X1=4

16. What is a weak acid?
17. State modern periodic law.
18. what is a catalyst.? Give an example
19. why does atomic size of an element decreases down the group in the modern periodic table?

IX. Answer the following questions

3X2=6

20. The compounds C_2H_6 , C_3H_8 , C_4H_{10} , C_5H_{12} , are in homologous series. Why?

Write the general name and formula for those carbon compounds

21. Nitrogen (Atomic no.7) and Phosphorous (At No. 15) belong to group 15 of the periodic table. Write the electronic configuration of these elements. Which of these elements will be more electronegative . Why?

22. What is neutralization reaction. ? Give an examples.

OR

Two solutions A and B , pH of solution A is 6 and pH of solution B is 8. Which solution has more hydrogen ion concentration ? Which of this is acidic and which one is basic.

X. Answer the following questions

3X3=9

23. Explain the cleansing action of soaps.

OR

Explain the two charecteristic feature of carbon that has enabled it to form large molecular

compounds

24. Draw a neat labelled diagram of the action of steam on a metal and write the reaction

25. Draw neat labelled diagram showing the conductivity of salt solution.

XI Answer the following questions

1X4=4

26. a)Explain the formation of the ionic compound sodium chloride with the help of electron dot structure.

b)What are alloys? Give 2 examples with their composition. Mention its uses.

Part : C
BIOLOGY

XII. Four alternatives are given for each of the following questions / incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet.

2X1=2

27. Which of the following cannot be added in composting pit to prepare compost.

- A) Plucked Sunflower plants B) Fruits and Vegetable peels
C) Flowers of plastic D) Redworms

28. The movement of plant parts in response to the force of attraction exerted by the earth is called

- A. hydrotropism B. geotropism
C. chemotropism D. phototropism

XIII Answer the following questions

2X1=2

29. Mention the components of ecosystem.

30. What is wind energy farm?

XIV Answer the following questions

3X2=6

31. What are the components of transport system in human beings ?. Mention their functions in brief.

OR

What are the components of transport system in highly evolved plants?. Mention their functions in brief.

32. What are the main stakeholders of forests and wildlife? Which among them do you think have the authority to decide the management of produce.

33. Draw a neat labelled diagram of the typical flower and label the male and female reproductive parts of the flower.

XV Answer the following questions

3X3=9

34. How is the equal genetic contribution of male and female parents ensured in the progeny

OR

Explain the term analogous and homologous organs with examples.

35. a) What is DNA copying? Mention its importance

b) i. List the parts of the male reproductive system

ii. How does developing embryo gets nourishment inside the mother's body?

XVI Answer the following questions

2X4=8

37. a) What are fossils? Explain its importance in evolutionary studies.

b) Explain law of independent assortment using Mendel's experiment .

38. a) Name the hormones associated with

i. puberty in males

ii. regulation of blood sugar levels in human.

b) Mention the parts of the human brain responsible for

i. voluntary action

ii. involuntary action.

RESOURCE TEAM MODEL PAPER – 1

KEY ANSWERS

I.

1. (B) Ampere
2. (C) Will increase
3. (B) Real and of same size

II.

4. $f = 2\text{m}$

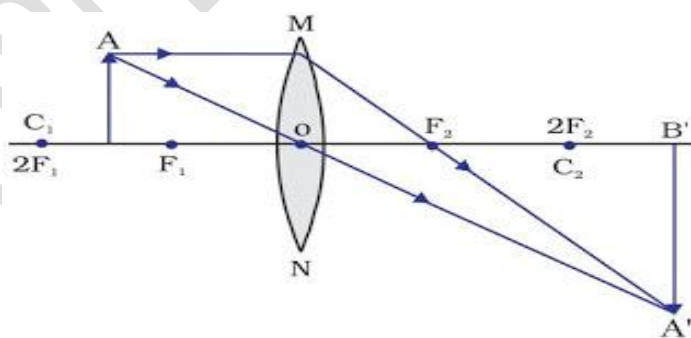
$$P = ?$$

$$P = \frac{1}{f} = \frac{1}{2} = 0.5\text{D}$$

5. Light will travel faster through crown glass. Because greater the refractive index, greater is the density of the medium. Greater the density of the medium, lesser is the speed of light.

III.

6.



7. i) Silver is better conductor because of lower resistivity.
ii) Nichrome has high resistivity or it is an alloy, it does not oxidize readily at high temperature.

8.

a) i) $V = 3V$

$R_1 = 10 \text{ ohm}$

$I_1 = ?$

We know that , $V = I_1 R_1$

$I_1 = V/R_1 = 3/10 = 0.3A$

$I_1 = 0.3A$

Current through 10 ohm resistor = 0.3 A

ii) $V = 3 V$

$R_2 = 15\text{ohm}$

$I_2 = ?$

We know that , $V = I_2 R_2$

$I_2 = V/R_2 = 3/15 = 0.2A$

$I_2 = 0.2A$

Current through 15ohm resistor = 0.2 A

b) Ammeter reading [I]

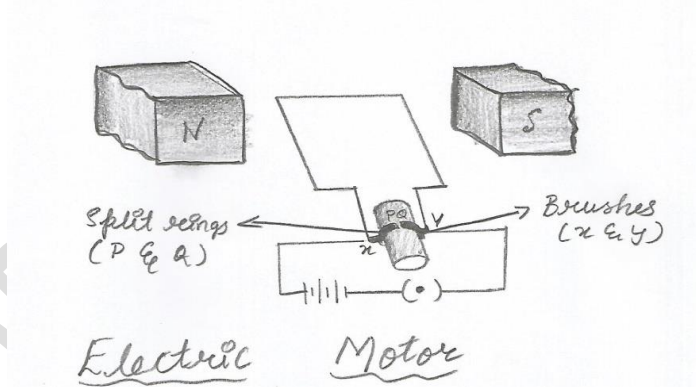
$I = I_1 + I_2$

$= 0.3A + 0.2A$

$I = 0.5 A$

IV

9.



10.

Object distance , $u = -50\text{cm}$

Image distance , $V = 50\text{cm}$

Focal length , $f = ?$

Power , $P = ?$

According to the lens formula

$$\frac{1}{f} = \frac{1}{V} - \frac{1}{u}$$

$$\frac{1}{f} = \frac{1}{-50} - \frac{1}{50}$$

$$\frac{1}{f} = \frac{-2}{50} = \frac{1}{25}$$

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

$$\text{Power of lens} = \frac{1}{f} = \frac{1}{-25}$$

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

$$\text{Power of lens} = \frac{1}{f} = \frac{1}{-25} = -0.04 \text{ D}$$

[OR]

Object distance , u = 40cm

Focal length , f = -20 cm

Image distance , V = ?

Magnification , M = ?

According to len's formula

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

$$\frac{1}{-20} = \frac{1}{v} + \frac{1}{40}$$

$$\frac{1}{v} = \frac{-2}{40} - \frac{1}{40} = \frac{-3}{40}$$

$$v = \frac{-40}{3} = -13.33 \text{ cm}$$

$$m = \frac{v}{u} = \frac{-13.33}{40} = -0.334$$

11.

The major constituents of biogas are methane , carbon dioxide , Nitrogen , Hydrogen sulfide and oxygen.

It is produced by breakdown of organic matter in an anaerobic environment , primarily consisting of methane and carbon dioxide.

The advantages of this plants are :

- a) It is eco-friendly , less cost.
- b) Biogas generation produces organic fertilizer.

12.

a) Ohm's law states that the current passing through a conductor is directly proportional to the potential difference across its ends, provided the physical conditions like temperature , density etc. remain unchanged.

The resistance of a conductor depends directly on its length , inversely on its area of cross-section and also on the material of the conductor.

b) It states that the heat produced in a conductor is directly proportional to:

i) The square of the current (I) through it

ii) Proportional to its resistance 'R' and

iii) The time 't' for which current is passed.

Mathematically it can be expressed as $H = I^2 R t$.

13.

Magnetic field lines are a visual tool used to represent magnetic field.

They describe the direction of the magnetic force on a north pole at any given position.

The direction of a magnetic field at a point is determined by placing a small compass needle which gets deflected when placed near a magnet due to the magnetic force exerted by the magnet on it .

The 2 important properties of magnetic field line are:

- The field is tangent to the magnetic field line.
- Field strength is proportional to the line density.

Or

a) Direct current is that current which flows with constant magnitude in the same direction

alternating current is that current whose magnitude changes continuously with time and whose direction reverses after equal intervals of time.

Advantages of A.C over D.C are generation of A.C is more economical than D.C and alternating Voltage can be easily stepped up or stepped down by using a transformer.

b) **Electric motor**

- * It converts electrical energy into mechanical energy.
- * It is based on magnetic effect of current.
- * Current is supplied to the coil placed in magnetic field by an external source of electrical energy. As a result of it , coil starts rotating.

Generator

- * It converts Mechanical into electrical
- * It is based on Electromagnetic induction.
- * The coil is rotated in a magnetic field by an external arrangement. As a result, an electric current is induced in the coil.

PART B - CHEMISTRY

VI.

14.

(A) Pink in acidic medium , yellow in basic medium.

15.

(C) But-1-ene

16.

Ans:- (C) Decreases

VII

17. Aqueous solutions of Ionic compounds contains Ions which help to conduct electricity.

18. Lithium , sodium and potassium formed a group called alkali metal group.

Their similar properties are

- They have one electron in outermost shell.
- All these are soft metals.

19. Will test it by bringing a burning candle near the hydrogen gas, where a pop sound is heard due to combustion of hydrogen gas.

VIII

20.

Ans:-

Saturated

*Each carbon atom is attached to four other atoms with single covalent bonds.

These are also called Alkanes.

Ex:- Carbon tetra-Chloride.

Unsaturated

* It contain either a carbon-carbon double bond ($c = c$) or carbon- carbon triple bond ($c \equiv c$) in their molecules.

These are called alkenes and alkynes respectively.

Ex:- CO_2 , Propyne

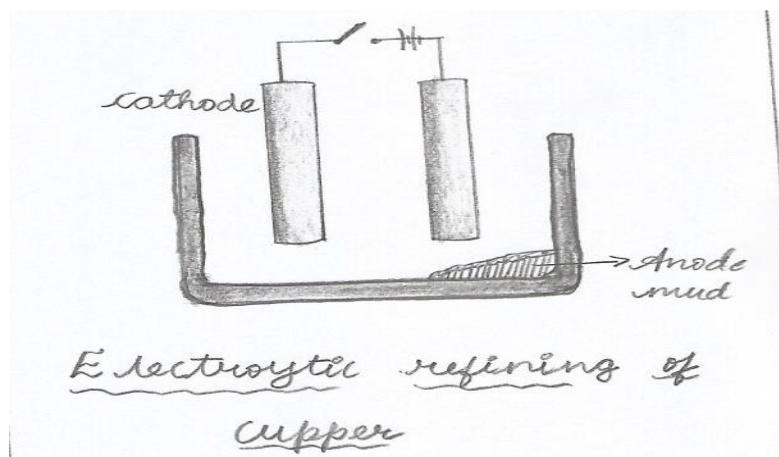
OR

Carbon , its allotropic forms and compounds burn in sufficient oxygen to give CO_2 and H_2O , with the liberation of large amount of heat and light.

Ex :- $C + O_2 \rightarrow CO_2 + \text{heat} + \text{light}$

$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O + \text{heat} + \text{light}$

21.



22. Metallic oxides are basic in nature because they react with dilute acids to form salt and water. They also react with water to form metal hydroxides which are alkaline in nature, as these metal hydroxides release OH^- ions in solution. The products obtained when copper oxide reacts with dilute hydrochloric acid is copper chloride and water.

IX

23.

The limitation of Mendeleev's periodic table are

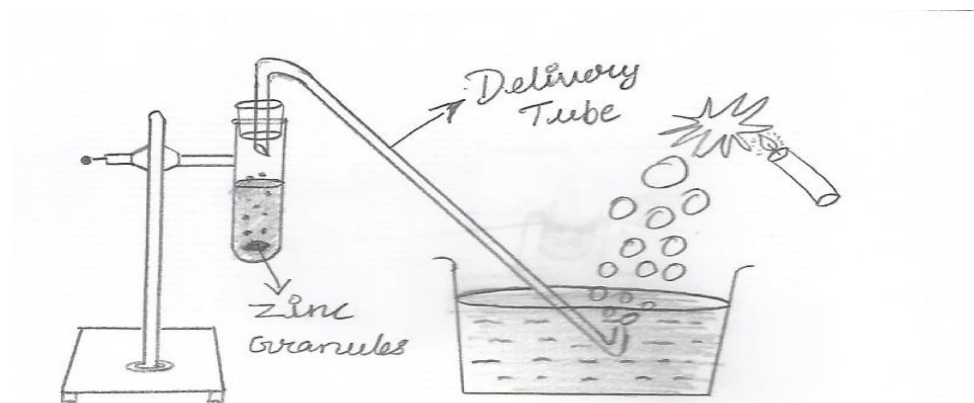
- Elements with large differences in properties were included in the same group. for example hard metal like copper and silver were included along with soft metals like sodium and potassium.
- The increasing order of atomic mass was not strictly followed throughout. For example in cobalt and nickel and Tellurium and indium.
- No proper position could be given to the element hydrogen. In the periodic table, the Location of hydrogen is uncertain. It was put with alkali metals within 1A class but Certain hydrogen properties are close to those of halogens. So, it can also be put for halogens in the band.
- Isotopes haven't been given separate place in periodic table.

OR

Ans:- The limitation of Newland's law of octaves are

- Newlands assumed that only 56 elements existed in nature and no more elements would be further discovered in the nearer future. But later on several new elements were discovered, whose properties couldn't be defined as per the law of octaves.
- In order to fit elements into law of octaves Newlands not only adjusted two elements in the Same slot but also adjusted some unlike elements under the same note.
- Iron possessing similar properties as cobalt and nickel is placed far away from these elements.

24.



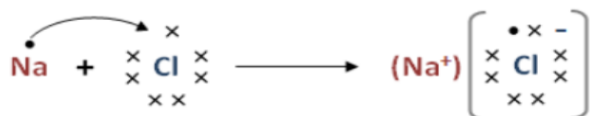
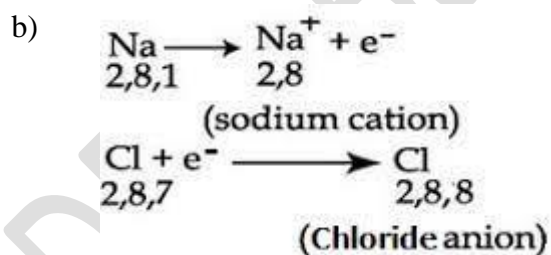
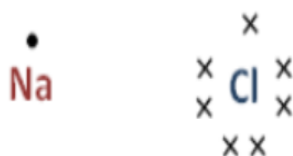
Reaction of Zinc Granules with HCl

25. Cinnabar (Hgs) is an ore of mercury. The metals beings less reactive can be obtained by reducing their oxides to metals by heating alone.
So, when cinnabar is heated in air , it first changes into its oxide and then into mercury metal.

X

26.

a) The electron dot structure for sodium[Na] and chlorine[Cl] are



c) Na^+ and Cl^- are the Ions present in the compound.

Part-C : Biology

XII.

27. (B) cake, milk packet, wooden sticks

28. (B) positively photo traffic and negatively geotropic.

XII.

29. CFCs are chemically reactive with the ozone, and deplete it. To protect ozone layer, manufacturing companies produce CFC free refrigerators, as International treaty with UNEP.

30. Ancient methods of rainwater harvesting systems used in the states

Kerala- surangam , Rajasthan- Khadi

XIV.

31.

Deoxygenated blood from different parts of the body is received by the right Atrium through superior and inferior Venacava.

Then blood moves into right ventricle from where it goes to lungs through Pulmonary artery.

In lungs it gets oxygenated, reaches left atrium through pulmonary veins.

Then the blood moves to left ventricle from where it is pumped to different body parts through Aorta

OR

Through the process of transpiration the plants lose the water from its aerial parts like leaves. This creates suction in the xylem which helps the roots in absorption of water by osmosis and upward transportation of water in a continuous channel.

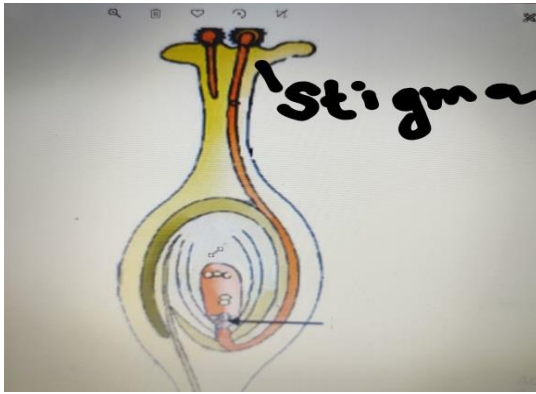
32.

The protests carried out by local people to save forests in India are:

A- The Chipko Movement started in Naini village Himalaya. In 1972, the villagers, mostly women, Niniy gerewal in Himalayas protested against the contractor sent by government. They successfully protected the trees by hugging them.

B- The sacrifice of life by more than 300 people in khejrli village of Rajasthan during 18th century. They saved Kejrli trees against soldiers of king.

33.



XV.

34. When the pea plant producing round seeds (RR) was crossed with the pea plant producing wrinkled seeds (rr) in F_1 generation, all were round seeded (Rr) plants. Further in F_2 generation, pea plants produced by self-pollination methods, only one-fourth were wrinkled-seeded plants.

Conclusion: The gene which codes for rounded seeds is dominant, the gene which codes for the wrinkled seeds is recessive.

When paired with a dominant gene, the recessive gene does not get phenotypically expressed. The recessive gene gets expressed only when it is in pair with the other recessive gene.

OR

Statement: "We can say that very dissimilar looking structures evolve from a common ancestral design". Name a current example of a plant species and explain this statement.

Since 2000 years humans cultivated wild cabbage as a food plant and generated different vegetables by artificial selection methods.

They are, Broccoli and cauliflower which were selected for arrested flower development.

Cabbage, Kale, were selected for the large leaves,

Radish, carrot, kohlrabi were cultivated for their swollen parts.

Conclusion: By studying artificial selection of different recently cultivated plants, by humans, it is clear that variety of new species can be developed from a common ancestral plant species. We say that even by natural selection for many years, so many diversified species might have developed from common ancestral design.

35.

Answer:

i) The fertilization takes place in the oviduct or fallopian tube.

ii) roles of ovary are:

A- releases one egg every month alternatively

B- produces female sex hormones, oestrogen and progesterone

iii) If there is no fertilization after one day the egg dies. it is eliminated from the body menstrual bleeding.

OR

In sexual reproduction,

(a) The cell division which helps to get the DNA amount to its half in germ cells is "meiosis".

After fertilization the DNA amount in zygote becomes double that of germ cells, called diploid number (paired set) of chromosomes.

This process helps to maintain constant number of chromosomes in the next generation, equal to that of the parental organism.

b)

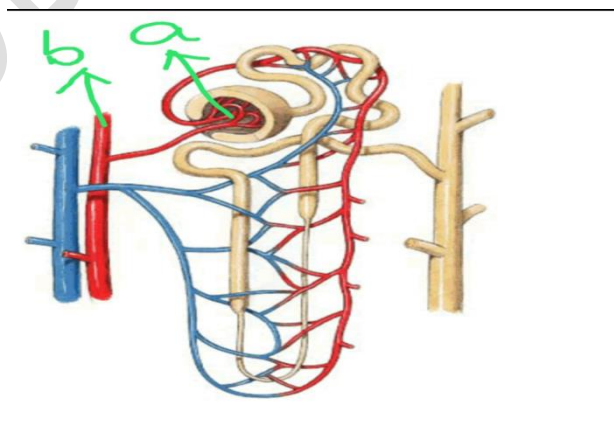
Male germ cells are very small microscopic in size. They are motile. They have elongated structure. They are produced in the testis of male reproductive system, in large numbers.

Female germ cells are large(as they store nutrition) macroscopic in size. They are immotile. They are spherical. They get produced in ovaries of female reproductive system only one in a month.

36.

Ans : Diagram showing the structure of 'nephron' in human beings.

showing the structure of nephron



XVI.

37. a) Homologous organs are structurally same organs of different organisms performing different functions. Examples :hands of human beings,fore legs of tiger, wings of the birds.

Analogous organs are structurally different organs of different organisms performing similar functions.Examples: wings of birds, Wings of insects, Wings of bats

b) Conclusions of mendel's experiment conducted on peas plant by considering cross between two characters in each generation:

A- for each characteristics there are two genes one is from maternal origin other one is the origin. Dominant gene controls the expression of the character.

B- Inheritance of each characteristics is independent of other characters because they are controlled by separate genes present in different chromosomes.

38. a) The hormone which protects the body in dangerous situation is "adrenaline".

In emergency adrenaline gets released to blood which reaches the target organs. It increases rate of heartbeat to provide more oxygen to the muscles. During this time the muscles of blood vessels near skin and digestive system contract which decreases blood supply to that parts. This increases the flow of blood to the diaphragm and rib muscles, which increases rate of respiration. In this way the animal will be able to face the emergency situations.

b) 4 functions of the fore brain are:

A- It is the Centre for thought memory and understanding.

B- It receives the impulses from the sense organs through sensory nerves

C- It also sends the messages to the organs of response muscles

D- It controls the logical thinking memory.

The part of the forebrain which controls hunger and sleep is hypothalamus

RESOURCE TEAM MODEL PAPER – 2

KEY ANSWERS

I.

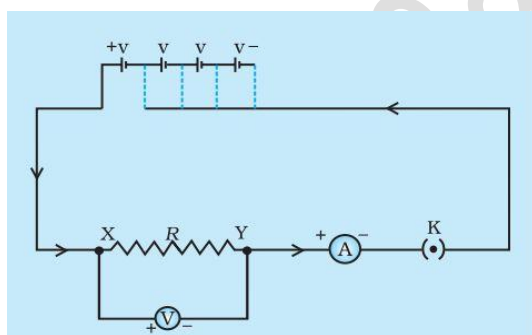
1. (C) Virtual and Erect
2. (A) Watt
3. (D) Circular in nature having common centre

II.

4. The ratio of sine of angle of incidence to sine of angle of refraction is constant for a given pair of media.
5. Because it has both magnitude and direction.

III.

6.



7.

Since, refractive index $= n = \frac{\text{Speed of light in vacuum}}{\text{Speed of light in medium}} = \frac{c}{v}$

$$\text{we get, } v = \frac{c}{n} = \frac{3 \times 10^8}{1.33} = \frac{3 \times 10^8}{4} \times 3'$$

$$= 2.25 \times 10^8 \text{ ms}^{-1}.$$

8. When 1 joule of work is done in carrying 1 coulomb of charge, from infinity to a point in the electric field, then potential at that point is called 1 volt.

Potential difference between two points is

$$V = \frac{W}{Q}$$

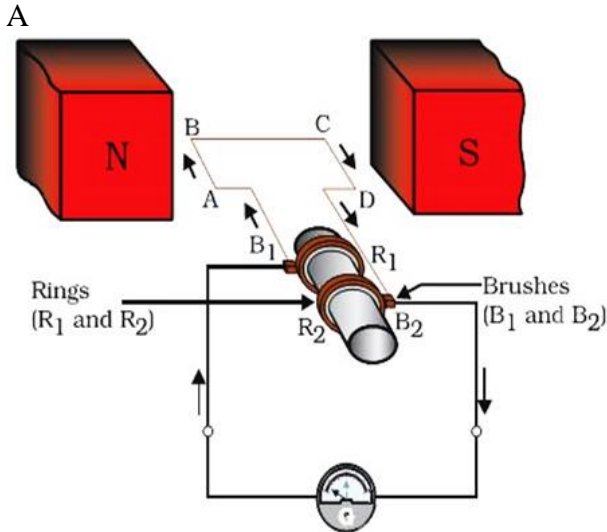
or

$$W = Q \times V$$

$$= 1 \times 3 = 3 \text{ J}$$

IV.

9.



An electric generator

10. $f = -20 \text{ cm}$, $h_o = 5 \text{ cm}$, $v = -15 \text{ cm}$.

Using, $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$, we get

$$\frac{1}{u} = \frac{1}{v} - \frac{1}{f} = \frac{1}{-15} - \frac{1}{(-20)}$$

$$\frac{1}{u} = \frac{-20 + 15}{300} = -\frac{5}{300}$$

$$u = -60 \text{ cm}.$$

Since, $m = \frac{h_i}{h_o} = \frac{v}{u}$, we get

$$h_i = \frac{v}{u} \cdot h_o = \frac{(-15)}{(-60)} \times 5$$

$$= \frac{5}{4} = 1.25 \text{ cm}.$$

Image is diminished and virtual.

OR

$$f = +18 \text{ cm}, v = 24 \text{ cm}$$

$$\text{Using, } \frac{1}{f} = \frac{1}{v} - \frac{1}{u}, \text{ we get, } \frac{1}{u} = \frac{1}{v} - \frac{1}{f}$$

$$= \frac{1}{24} - \frac{1}{18} = \frac{3-4}{72}$$

$$\Rightarrow u = -72 \text{ cm.}$$

Object should be kept at a distance of 72 cm on the left side of the convex lens.

$$\text{Magnification, } m = +\frac{v}{u} = \frac{24}{-72} = -\frac{1}{3}$$

Image is inverted, real and diminished.

11. .

- (i) It burns without smoke and leave no residue therefore causes no atmospheric pollution.
- (ii) Its heating capacity is high, i.e. it has high calorific value. Main constituents of bio gas: The composition of bio gas varies depending upon the nature of organic matter feeding in the digester and advanced waste treatment technology.

V.

12.

Answer.

- Electric Current: The amount of charge 'Q' flowing through a particular area of cross section in unit time 't' is called electric current, i.e.
- Electric current, $I = Q/t$
- SI unit of electric current is ampere.
- One ampere of current is that current which flow when one coulomb of electric charge flowing through a particular area of cross-section of the conductor in one second, i.e. $1\text{A} = 1\text{Cs}^{-1}$.
- The direction of conventional current is A to B, i.e. opposite to the direction of flow of electrons. In a metal, flow of electrons carrying negative charge constitutes the current.

OR

Two identical wires one of nichrome and other of copper are connected in series and a current (I) is passed through them. State the change observed in the temperatures of the two wires. Justify your answer. State the law which explains the above observation.

Answer. The resistivity of nichrome is more than that of copper so its resistance is also high. Therefore, large amount of heat is produced in the nichrome wire for the same current as compared to that of copper wire. Accordingly, more change in temperature is observed in the nichrome wire. This is explained by Joule's law of heating.

Joule's law of heating:

It states that the amount of heat produced in a conductor is

- (i) directly proportional to the square of current flowing through it, i.e.
 $H \propto I^2$.
- (ii) directly proportional to the resistance offered by the conductor to the current,
i.e. $H \propto R$
- (iii) directly proportional to the time for which current is flowing through it, i.e.

$$H \propto t$$

Combining these, we get

$$H \propto I^2 R t$$

or
$$H = K I^2 R t$$

where K is proportionality constant and in SI system, it is equal to one.

13.

- (a) When a bar magnet is pushed into the coil, magnetic field lines linked with the coil changes (increases). It causes the electric current to get induced in it. The needle of galvanometer will move momentarily in one direction.
- (b) When a bar magnet is withdrawn from inside the coil, the magnetic field lines linked with the coil changes but in decreasing order. Current will be induced in the coil which will be indicated by deflection of needle in the galvanometer. The deflection is opposite to that in case (a). This indicates that the direction of induced current is now opposite to the direction of induced current in case (a).
- (c) When bar magnet is held stationary inside the coil, there is no deflection in the galvanometer. This is because there is no change in magnetic field lines linked with the coil. Hence, no induced current will flow through the coil.

PART – B CHEMISTRY

VII.

14. (D) Propene

15. (C) Calcination

VIII.

16. A **weak acid** is an acid chemical which does not dissociate (split into ions) completely in water solution. It does not give all its hydrogen ions (H^+) ions into the solution.

17. “The physical and chemical properties of the elements are **periodic** functions of their atomic numbers”.

18. A substance that enables a chemical reaction to proceed at a usually faster rate or under different conditions (as at a lower temperature) than otherwise possible.

Examples: Nickel catalyst in hydrogenation of vegetable oils. and enzymes in biological system.

19. Atomic size increases down the group because of addition of extra shell. It increases the distance between the outermost electrons and the nucleus.

IX.

20. A series of compounds in which the same functional group substitutes for hydrogen in a carbon chain is called a homologous series. In given series CH_4 and C_2H_6 — these differ by a $-CH_2-$ unit C_2H_6 and C_3H_8 — these differ by a $-CH_2-$ unit.

General name: Alkane

Formula: C_nH_{2n+2}

21. Atomic number of Nitrogen is 7 hence Electronic configuration of Nitrogen is $1s^2 2s^2 2p^3$

Atomic number of Nitrogen is 15 hence Electronic configuration of Phosphorous is $1s^2 2s^2 2p^6 3s^2 3p^3$

On moving down a group in the periodic table, the number of shell increases. Due to this, valence electrons move away from the electrons and the effective nuclear charge decreases. This causes the decrease in the tendency to attract electron and hence electro negativity decreases. Because of all these reasons Nitrogen is more electronegative than phosphorus.

22. The reaction between an acid and a base to give a salt and water is known as a neutralization reaction.

Base + Acid \rightarrow Salt + Water

$NaOH + HCl \rightarrow NaCl + H_2O$

OR

solution A has more hydrogen ion concentration.

solution A of pH 6 is acidic and solution B of pH 8 is basic.

X.

23. Cleansing action of soap.

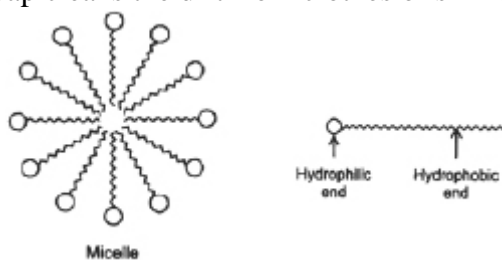
A soap molecule has two parts

1. Ionic hydrophilic part which is soluble in water
2. non-polar hydrophobic long hydrocarbon chain which is insoluble in water.

When soap dissolves in water, a large number of soap molecules associate with their hydrophobic tail pointing towards the inside and hydrophilic ends in contact with water. This is soap micelle.

Mechanism of action of soap: soap solution is the colloidal solution of micelles. The oil and dirt of the clothes are absorbed by the hydrophobic part of the soap by the mechanical action of rubbing. Layers from dirty surfaces are converted into small globules. A stable emulsion of oil in water is formed. The emulsified oil globules consisting of dirt can be readily washed with water.

Thus, soap cleans the dirt from clothes or skin by forming micelles.



soap molecule and a micelle.

OR

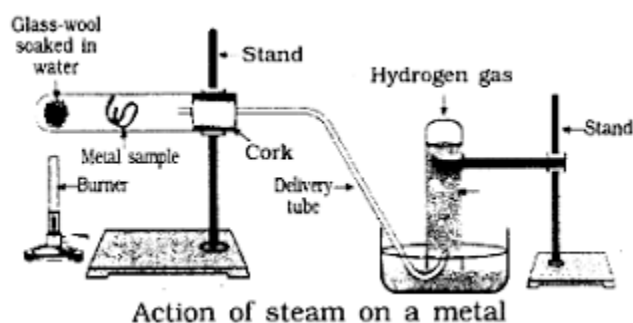
Characteristic features of carbon which enable it to make large molecules are

Catenation and Tetravalency.

Catenation: The unique ability to form bonds with other atoms of carbon, giving rise to large molecules. This property is called catenation. These compounds may have long chains of carbon, branched chains of carbon or even carbon atoms arranged in rings. Compounds of carbon, which are linked by only single bonds between the carbon atoms are called saturated compounds. Compounds of carbon having double or triple bonds between their carbon atoms are called unsaturated compounds.

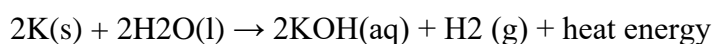
Tetravalency: Carbon has a valency of four, it is capable of bonding with four other atoms of carbon or atoms of some other mono-valent element. Compounds of carbon are formed with oxygen, hydrogen, nitrogen, sulphur, chlorine and many other elements giving rise to compounds with specific properties which depend on the elements other than carbon present in the molecule.

24.



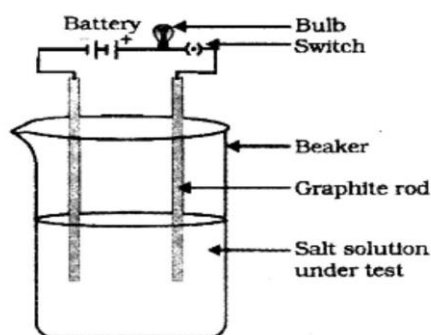
Metal + Water \rightarrow Metal oxide + Hydrogen

Metal oxide + Water \rightarrow Metal hydroxide



25.

The diagram of the apparatus used to test the conductivity of sodium chloride solution:

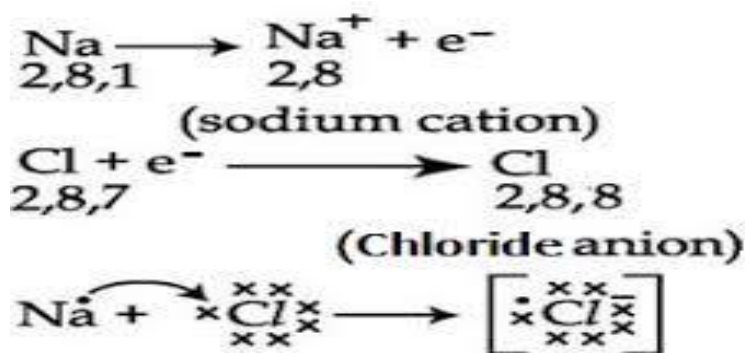


XI.

26 (a) Sodium atom has one electron in its outermost shell. If it loses the electron from its M shell then its L shell now becomes the outermost shell and that has a stable octet. The nucleus of this atom still has 11 protons but the number of electrons has become 10, so there is a net positive charge giving us a sodium cation Na^+ .

chlorine has seven electrons in its outermost shell and it requires one more electron to complete its octet. If sodium and chlorine were to react, the electron lost by sodium could be taken up by chlorine. After gaining an electron, the chlorine atom gets a unit negative charge, because its nucleus has 17 protons and there are 18 electrons in its K, L and M shells. This gives us a chloride anion Cl^- . So both these elements can have a give-and-take relation between them

Formation of sodium chloride Sodium and chloride ions, being oppositely charged, attract each other and are held by strong electrostatic forces of attraction to exist as sodium chloride ($NaCl$)



FORMATION OF SODIUM CHLORIDE

(b) An alloy is a homogeneous mixture of two or more metals, or a metal and a non-metal.

Examples: steel- mixture of iron with nickel and chromium

ornamental gold- mixture of gold with copper or silver.

brass- mixture of copper and zinc

bronze- mixture of copper and tin.

solder- mixture of lead and tin (any 2)

Uses of alloys.

1. Improves the properties of the metals.
2. Alloying helps to protect from corrosion of metals.

PART: C BIOLOGY

XII.

27.C. Flowers of plastic

28. B. Geotropism

XIII .

29. Two components of ecosystem are

1. biotic components comprising of all living organisms
2. abiotic components comprises of temperature, rainfall, wind, soil and minerals

XIV.

30. A number of windmills erected over large area, whose energy output is coupled together to produce electricity on commercial scale is known as wind energy farm. Kanyakumari wind energy farm in Tamilnadu.

31. Components of transport system in human are blood and lymph. Functions are:

1. Red blood cells carry oxygen from lungs to all cells of the body. Blood plasma carries digested food, proteins, common salt, waste products and hormones from one part to another part of the body.
2. Lymph circulates large protein molecules by carrying from tissues into blood stream, digested fat from intestine and excess fluid from extracellular space back into blood.

OR

Components of transport in higher plants are

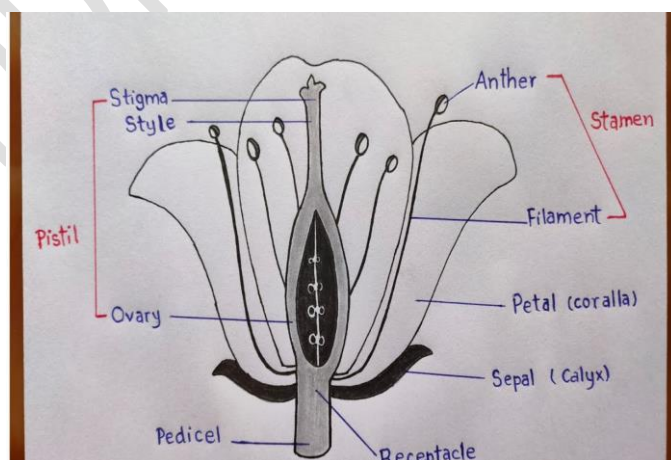
1. Xylem consisting of xylem vessels and tracheid transports water and dissolved minerals to all parts of the body
2. phloem tissue consisting of sieve tubes and companion cells transports food made in leaves by photosynthesis to all plant parts.

32. Four main stake holders of wildlife and forests are:

- i. the local people
- ii. the forest department of the government
- iii. the industrialists who use various products for their factories
- iv. the forests and wildlife activists who want to save the forests.

Local people should have the authority to decide management of forest produce as they are well versed with the sustainable utilization of resources since ancient time without causing any harm.

33.



XV.

34. The equal genetic contribution of male and female parents in the progeny is ensured by sexual reproduction process involving gametes which have only half the number of the chromosome as compared to somatic cells (non reproductive cells)

when male and female gamete combine during sexual reproduction resulting in the formation of zygote contribute to equal amount of DNA. In human's sperm (male gamete) has 23 chromosomes and female gamete has 23 chromosomes. The fusion and contribution of these chromosomes during sexual reproduction ensures equal genetic contribution of male and female parents in the progeny.

OR

Homologous organs are those organs which have the same basic structural design and origin but have different functions.

For example, the forelimbs of frogs, a lizard, a bird and man can have a basic design of bones, but they perform different functions

Analogous organs are those organs which have different basic structural design and origin but have similar functions.

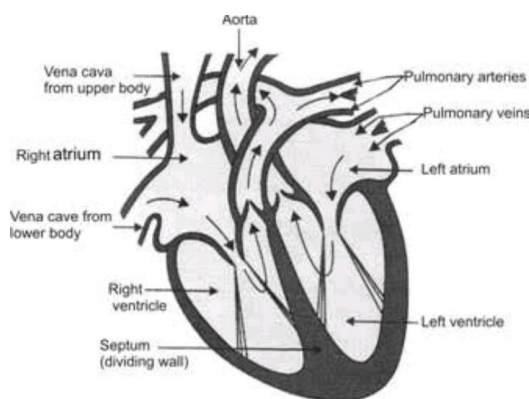
For example, The wings of birds and insects.

35(a) A process where a DNA molecule produces two similar copies of itself in a reproducing cell is called **DNA copying**. Importance :-

- It makes the transmission of characters from parents to the next generation possible.
- It causes variation in the population which is the basis of evolution.

(b). (i)The male reproductive part system in human beings consists of testes which produce sperms, vas deferens, seminal vesicles, prostate gland, urethra, and penis. (ii) The embryo gets nutrition from the mother's blood with the help of a special tissue called placenta.

36



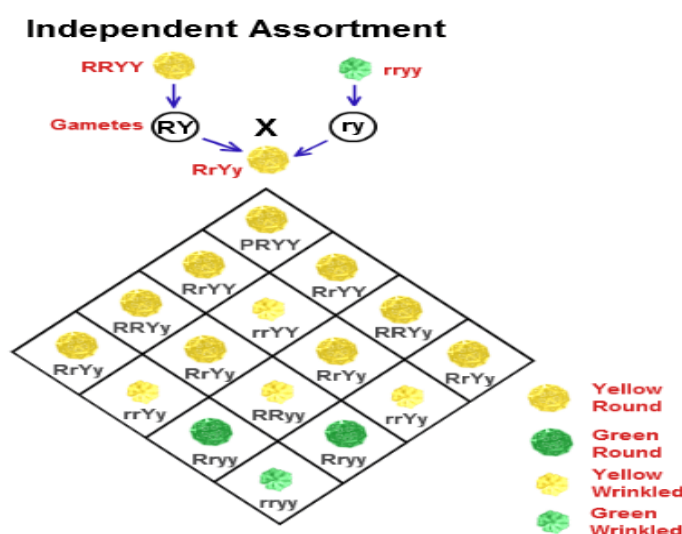
SECTION OF HUMAN HEART.

XVI.

37 (a). Fossils are the remains of impressions of dead plants or animals which died millions of year ago. The study of fossils helps us to know about the evolution of species. Fossils tell us how new species are developed from the old. Fossils provide evidence of evolution by revealing characteristics of past organisms and the changes that have occurred in these organisms to give rise to present organisms. Therefore, fossils have an importance in deciding evolutionary relationship.

For example, a fossil called Archaeopteryx has feathered wings like birds but teeth and tail like reptiles hence suggesting that birds and reptiles had a common ancestor.

(b) Law of independent assortment is based on dihybrid cross.



It states that inheritance of one character is always independent of the inheritance of other characters within the same individual. In other words, if the inheritance of more than one character is studied simultaneously, the factors or genes for each character assort out independently to the other gene or factor.

A good example of independent assortment is Mendelian dihybrid cross. The presence of new combinations - round green and wrinkled yellow, suggests that the genes for the shape of the seed and color of the seed are assorted independently.

38.(a). Hormones associated with

- i. testosterone
- ii. insulin

(b). i. three major parts of the brain are forebrain, midbrain and hindbrain

ii. brain parts responsible for

voluntary action: cerebrum in forebrain

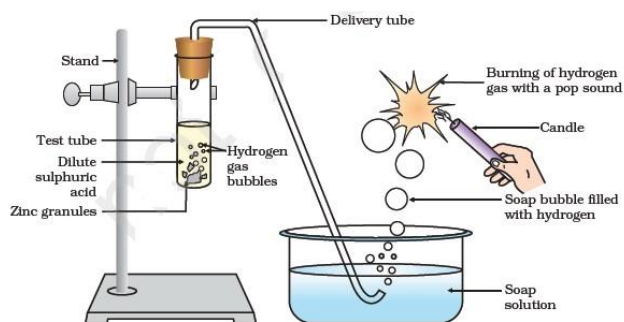
involuntary action: medulla in hindbrain and midbrain

L.M.R HAND BOOK

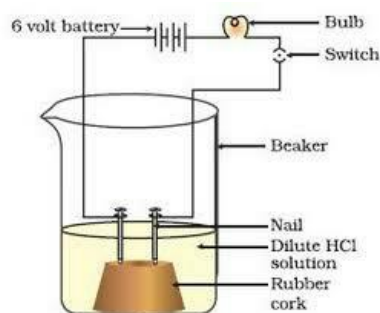


Don't Panic and Stay Positive!

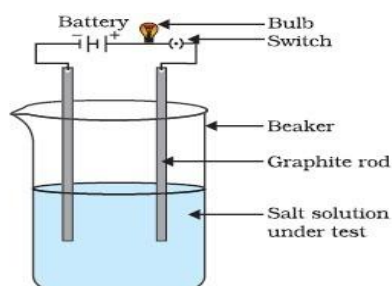
IMPORTANT DIAGRAMS FOR SSLC EXAM JUNE 2021



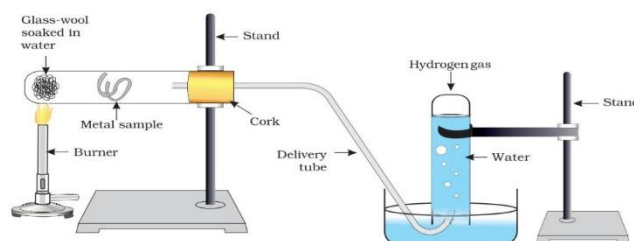
REACTION OF ZINC GRANULES WITH DILUTE SULPHURIC ACID



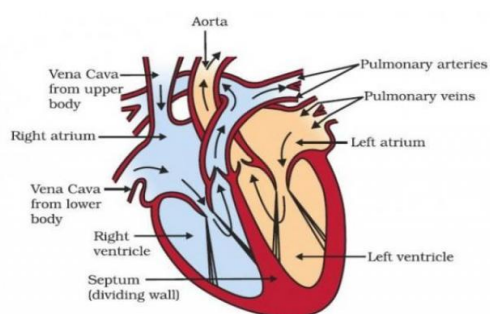
ACID SOLUTION IN WATER CONDUCTS ELECTRICITY



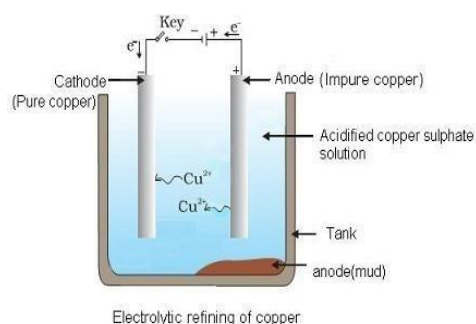
TESTING THE CONDUCTIVITY OF A SALT SOLUTION



Reaction of metal with steam

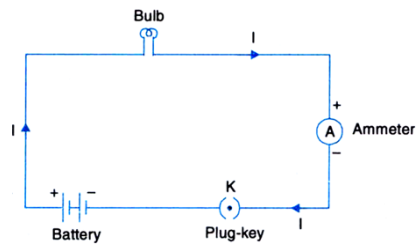


HUMAN HEART

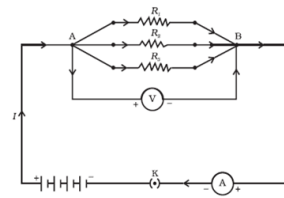


Electrolytic refining of copper

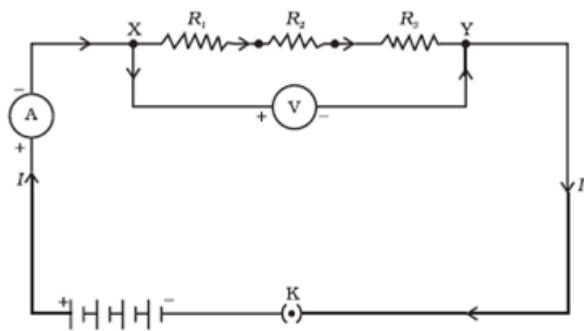
ELECTROLYTIC REFINING OF COPPER



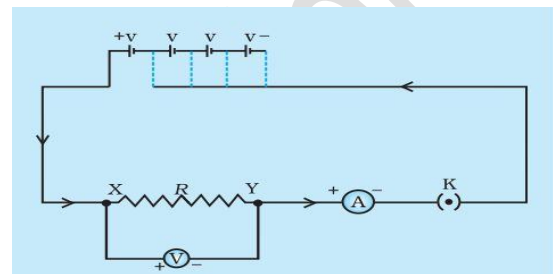
SIMPLE CIRCUIT



RESISTORS IN PARALLEL



RESISTORS IN SERIES



**CIRCUIT DIAGRAM TO STUDY
OHM'S LAW**

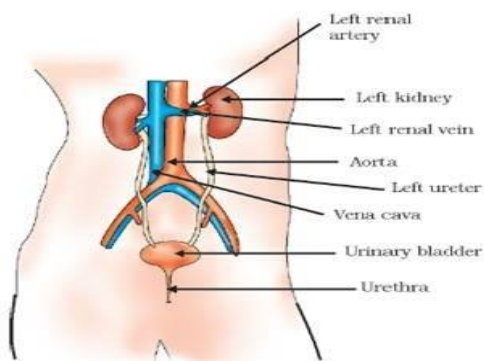
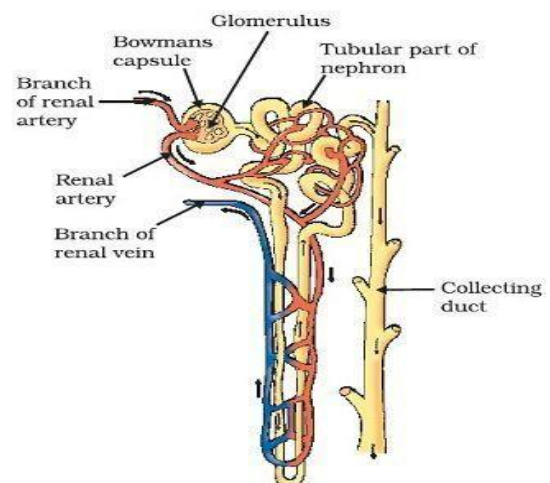
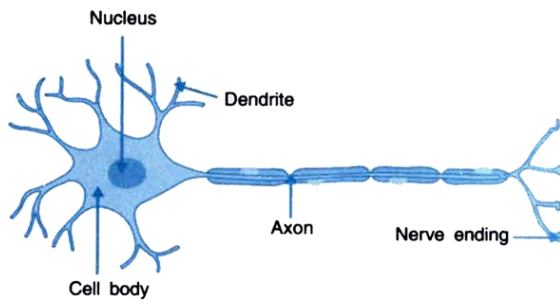


Figure 6.13
Excretory system in human beings



STRUCTURE OF NEPHRON



NEURON

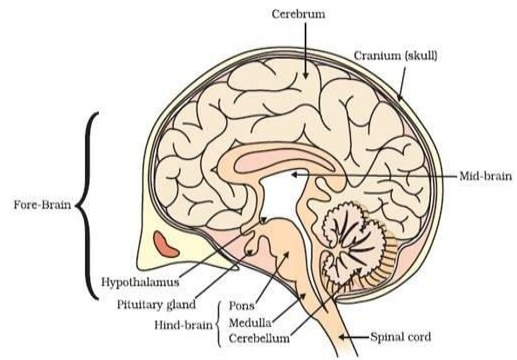
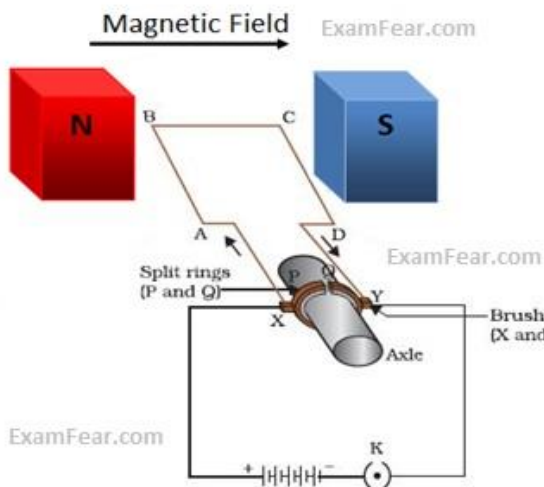
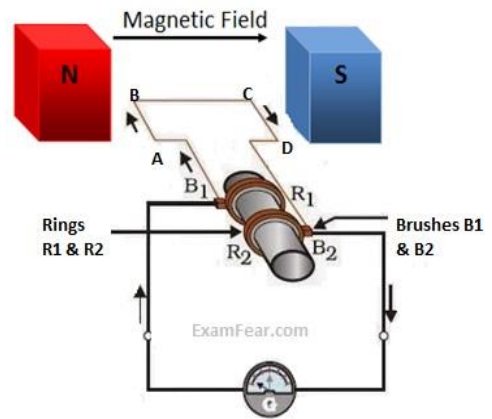


Figure 7.3 Human brain

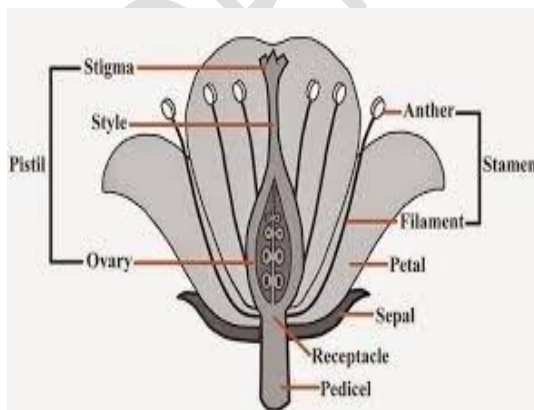
HUMAN BRAIN



ELECTRIC MOTOR



ELECTRIC GENERATOR



STRUCTURE OF A FLOWER

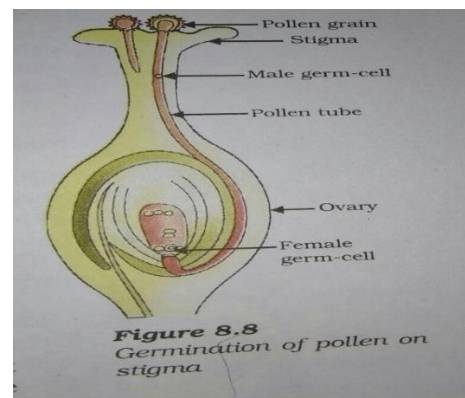
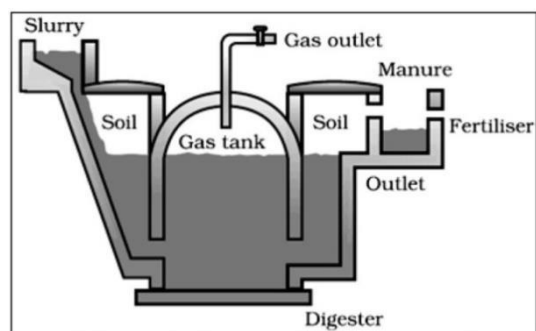
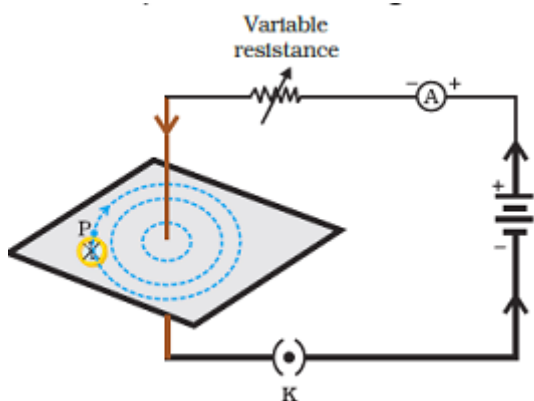


Figure 8.8 Germination of pollen on stigma

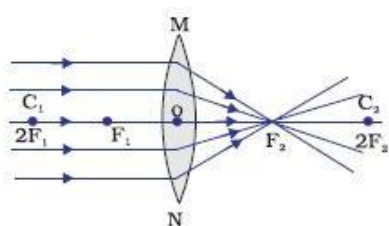
GERMINATION OF POLLEN ON STIGMA



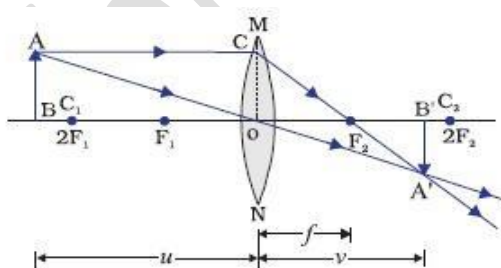
Schematic diagram of a bio-gas plant

A pattern of concentric circles indicating the field lines of a magnetic field around a Straight conducting wire

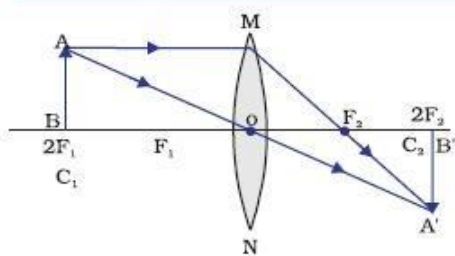
NATURE, POSITION & RELATIVE SIZE OF THE IMAGE FORMED BY A CONVEX LENS



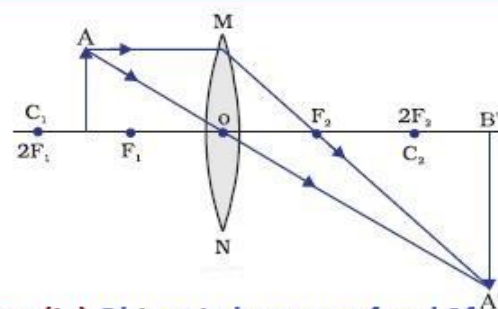
Case (i) Object at infinity



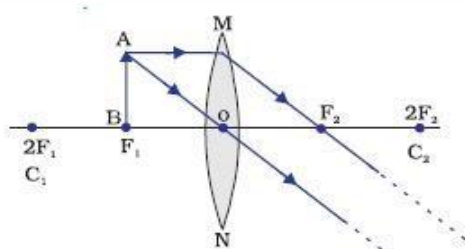
Case (ii) Object at beyond $2f$



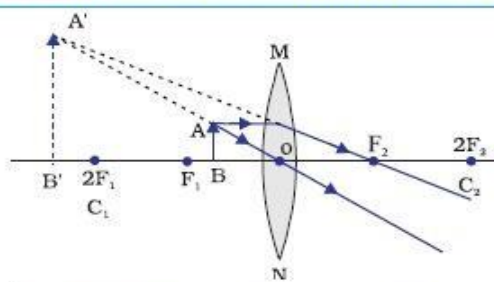
Case (iii) Object at $2f$



Case (iv) Object in between f and $2f$



Case (v) Object at f

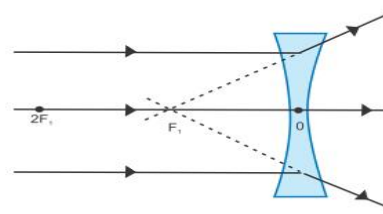


Case (vi) Object distance $< f$

1) When object is placed at infinity

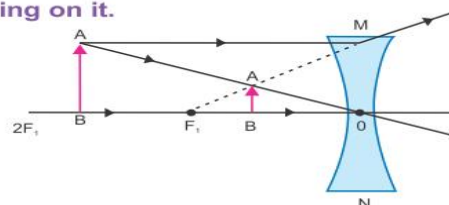
Image is :

- formed at F_1
- virtual and erect
- highly diminished

**2) A concave lens diverges all rays falling on it.**

Therefore for all positions, image is :

- on the same side of object
- virtual and erect
- diminished



NATURE, POSITION & RELATIVE SIZE OF THE IMAGE FORMED BY A CONCAVE LENS

Sl. No.	Components	Symbols
1	An electric cell	
2	A battery or a combination of cells	
3	Plug key or switch (open)	
4	Plug key or switch (closed)	
5	A wire joint	
6	Wires crossing without joining	
7	Electric bulb	
8	A resistor of resistance R	
9	Variable resistance or rheostat	
10	Ammeter	
11	Voltmeter	

SYMBOLS OF SOME COMMONLY USED COMPONENTS IN CIRCUIT DIAGRAMS

IMPORTANT DIFFERENCES

ACIDS	BASES
Acids are sour in taste.	Liquids are bitter in taste.
They change blue litmus to red.	They change red litmus to blue.

ACIDIC OXIDES	BASIC OXIDES
They are formed when non-metals dissolve in water.	They are formed when metals dissolve in water.
Ex: Na_2O , MgO	Ex: H_2CO_3

METALS(PHYSICAL)	NON-METALS
They are good conductors of heat and electricity.	They are poor conductors of heat and electricity.
They are malleable and ductile	They are not malleable and ductile.

METALS(CHEMICAL)	NON-METALS
Metals loose electrons.	Non-metals accept electrons.
Metals reacts with oxygen to form basic oxides.	Non-metals reacts with oxygen to form acidic oxides.

IONIC COMPOUNDS	COVALENT COMPOUNDS
They have high melting and boiling points.	They have low melting and boiling points.
They are generally soluble in water and insoluble in organic solvents.	They are insoluble in water and are soluble in organic solvents.
They are formed of ionic bonds.	They are formed of covalent bonds.

ROASTING	CALCINATION
The sulphide ores are converted into oxides by heating strongly in excess air.	The carbonate ores are converted into oxides by heating strongly in limited air.

VEINS	ARTERIES
Carry deoxygenated blood to the heart.(except pulmonary vein)	Carry oxygenated bolod from the heart.(except pulmonary artery)
Valves are present.	Valves are absent.
Blood flows with low pressure.	Blood flows with high pressure.

PHOTOTROPISM	GEOTROPISM
Growth of the plants(stem) towards sunlight.	Growth of the plant i.e. roots towards gravity.

HYDROTROPISM	CHEMOTROPISM
The growth or turning of the plant roots towards or away from water.	The growth of the plant which is navigated by a chemical stimulus.

INVOLUNTARY ACTIONS	REFLEX ACTIONS
---------------------	----------------

This takesplace continuously without our will.	This takesplace in response to the stimulus in the environment.
Ex: heart beat, respiration	Ex: we take out our hand on touching a hot object.

REFLEX ACTIONS	WALKING
This is an involuntary action.	This is a voluntary action.
This happens due to stimulus in the environment.	This happens on our conscious.
Centre of reflex action is spinal cord.	Centre of voluntary action is brain.

DYNAMO	MOTOR
It converts mechanical energy into electrical energy.	It converts electrical energy into mechanical energy.

AC DYNAMO	DC DYNAMO
Produces Alternate current .	Produces Direct current .
Complete rings of copper are used.	Split rings of copper are used.
Direction of the current changes for every $\frac{1}{2}$ rotation.	Directions of the current do not change.

BIODEGRADABLE SUBSTANCES	NON-BIODEGRADABLE SUBSTANCES
These substances can be decomposed by micro-organisms.	These substances cannot be decomposed by micro-organisms and pollute soil & water.
Ex: plant and animal waste.	Ex: plastic, glass.

SATURATED HYDROCARBONS	UNSATURATED HYDROCARBONS
Less reactive	More reactive
Have single bond between carbon atoms.	Have double or triple bonds between carbon atoms.

HARD WATER	SOFT WATER
This water does not give much lather with soap.	This water gives much lather with soap.
This water is not suitable for washing clothes.	This water is suitable for cleaning clothes.

Soaps	Detergents
Long chain sodium and potassium salts of carboxylic acids.	Sodium salts of sulphuric acid.
They don't remove dirt in hard water.	They remove dirt in hard water.

PERIOD	GROUP
Horizontal rows in the periodic table.	Vertical columns in the periodic table.
There are 7 periods in the modern periodic table.	There are 18 groups in the periodic table.

SELF POLLINATION	CROSS POLLINATION
It is the transfer of pollen grains from the anther to the stigma of a same flower or a different flower of the same plant.	It is transfer of pollen grains from the anther to the stigma of a different flower on the different plant of the same kind.

Pollination	Fertilization
It is the process of transfer of pollen grains from anther to stigma of a flower.	It is the process of fusion of male and female gametes.
Pollination ends with fertilization.	Fertilization

MONOHYBRIDIZATION	DIHYBRIDIZATION
Monohybrid cross is a cross between two plants in which one character is considered.	Dihybrid cross is a cross between two plants in which two characters are considered.
Phenotypic ratio 3:1	Phenotypic ratio 9:3:3:1

HOMOLOGOUS ORGANS	ANALOGOUS ORGANS
They have same structure but perform different functions.	They have different structure but perform the same function.
Ex: Human hands and forelimbs of Horse.	Ex: wings of an insect and wings of a bird.

REAL IMAGE	VIRTUAL IMAGE
The image can be obtained on the screen.	The image cannot be obtained on the screen.
The image is inverted.	The image is erect.

IMPORTANT LAWS

1. **DOBEREINER'S LAW OF TRIADS:** when the three element in the triad were written in the order of increasing atomic masses, the atomic mass of the middle element is roughly the average of the atomic masses of the other two elements.
2. **NEWLAND'S LAW OF OCTAVES:** when eight elements are arranged in the increasing order of their atomic masses , every eighth element has the properties similar to that of first.
3. **MENDELEEV'S PERIODIC LAW:** Properties of elements are a periodic function of their atomic masses.
4. **MODERN (MOSELEY) PERIODIC LAW:** Properties of elements are a periodic function of their atomic number.
5. **LAWS OF REFRACTION:** * The incident ray, the refracted ray and the normal at the point of incidence all lie in the same plane.
* The ratio of the sine of the angle of incidence and sine of the angle of refraction is constant.
7. **OHM'S LAW:** In an electric circuit the potential difference V, across the ends of a given metallic wire is directly proportional to the current flowing through it.

$$V \propto I$$

8. **JOULE'S LAW OF HEATING:** The heat produced in a resistor is directly proportional to the

- i) square of the current
- ii) Resistance of the conductor
- iii) time of flow of current

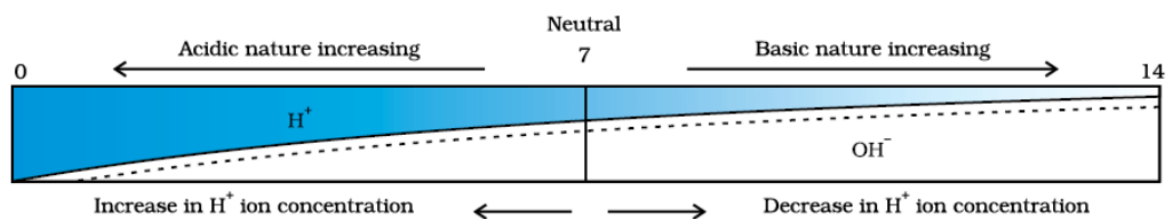
$$H = I^2 R t$$

9. **RIGHT HAND THUMB RULE:** It states that, if the thumb of the right hand is in the direction of the current flow, then the folded fingers show the direction of the magnetic field.

10. FLEMING'S LEFT HAND RULE (MOTOR RULE): When the thumb, fore finger and the middle finger of left hand are held perpendicular to each other, the fore finger is pointing the direction of the magnetic field, then the centre finger shows the direction of the current and the thumb shows the direction of the force acting on the conductor.

11. FLEMING'S RIGHT HAND RULE (GENERATOR RULE): When the thumb, fore finger and the middle finger of the right hand are held perpendicular to each other , the fore finger shows the direction of the magnetic field, the thumb shows the direction of the motion of the conductor then the middle finger shows the direction of the induced current.

Variation of PH with the change in concentration of H⁺ and OH⁻ ions.



- 0-6.9 = ACID
- 7 = NEUTRAL
- 7.1 – 14 = BASE

SOME NATURALLY OCCURRING ACIDS:

Table 2.3 Some naturally occurring acids

Natural source	Acid	Natural source	Acid
Vinegar	Acetic acid	Sour milk (Curd)	Lactic acid
Orange	Citric acid	Lemon	Citric acid
Tamarind	Tartaric acid	Ant sting	Methanoic acid
Tomato	Oxalic acid	Nettle sting	Methanoic acid

RELATIVE REACTIVITIES OF METALS:

K	Potassium	Most reactive
Na	Sodium	
Ca	Calcium	
Mg	Magnesium	
Al	Aluminium	
Zn	Zinc	
Fe	Iron	
Pb	Lead	
H	Hydrogen	
Cu	Copper	
Hg	Mercury	Reactivity decreases
Ag	Silver	
Au	Gold	
		Least reactive

K	Electrolysis
Na	
Ca	
Mg	
Al	
Zn	Reduction using carbon
Fe	
Pb	
Cu	
Ag	Found in native state
Au	

SATURATED HYDROCARBONS

Meth – C=1

Eth - C=2

Prop - C=3

Buta- C=4

Pent- C=5

Hexa- C=6

ALKANES - General formulae C_nH_{2n+2} (single bond between C-C atoms)

SL.NO.	NAME OF THE ALKANE	MOLECULAR FORMULA	STRUCTURE
01	METHANE	CH_4	<pre> H H - C - H H </pre>
02	ETHANE	C_2H_6	<pre> H H H - C - C - H H H </pre>
03	PROPANE	C_3H_8	<pre> H H H H - C - C - C - H H H H </pre>
04	BUTANE	C_4H_{10}	<pre> H H H H H - C - C - C - C - H H H H H </pre>
05	PENTANE	C_5H_{12}	<pre> H H H H H H - C - C - C - C - C - H H H H H H </pre>
06	HEXANE	C_6H_{14}	<pre> H H H H H H H - C - C - C - C - C - C - H H H H H H H </pre>

ALKENES - General formulae C_nH_{2n} (DOUBLE bond between C-C atoms)

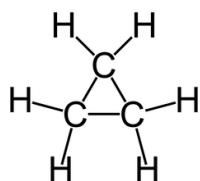
SL.NO.	NAME OF THE ALKENE	MOLECULAR FORMULA	STRUCTURE
01	ETHENE	C_2H_4	$\begin{array}{c} H & & H \\ & \backslash & / \\ & C = C \\ & / & \backslash \\ H & & H \end{array}$
03	PROPENE	C_3H_6	$\begin{array}{c} H & & H & & H \\ & \backslash & / & & \\ & C = C & - & C & - & H \\ & / & & \\ H & & & H \end{array}$
04	BUTENE	C_4H_8	$\begin{array}{c} H & & H & & H & & H \\ & \backslash & / & & & & \\ & C = C & - & C & - & C & - & H \\ & / & & & & \\ H & & & H & & H \end{array}$
05	PENTENE	C_5H_{10}	$\begin{array}{c} H & & H & & H & & H & & H \\ & \backslash & / & & & & & & \\ & C = C & - & C & - & C & - & C & - & H \\ & / & & & & & & \\ H & & & H & & H & & H \end{array}$

ALKYNES - General formulae C_nH_{2n-2} (TRIPLE bond between C-C atoms)

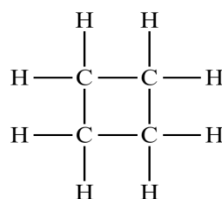
SL.NO.	NAME OF THE ALKENE	MOLECULAR FORMULA	STRUCTURE
01	ETHYNE	C_2H_2	$H-C \equiv C-H$ <p>ethyne (acetylene)</p>
02	PROPYNE	C_3H_4	$\begin{array}{c} H \\ \\ H-C \equiv C-C-H \\ \\ H \end{array}$
03	BUTYNE	C_4H_6	$\begin{array}{c} H & & H \\ & & \\ H-C \equiv C-C-C-H \\ & & \\ H & & H \end{array}$
04	PENTYNE	C_5H_8	$\begin{array}{c} H & & H & & H \\ & & & & \\ H-C-C-C-C \equiv CH \\ & & & & \\ H & & H & & H \end{array}$

CYCLIC ALKANES GENERAL FORMULA C_nH_{2n} (ALL SINGLE BONDS)

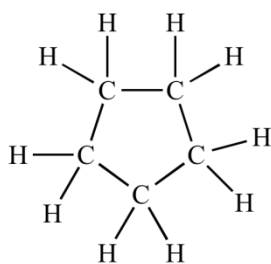
CYCLOPROPANE C_3H_6



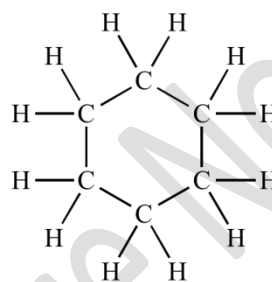
CYCLO BUTANE C_4H_8



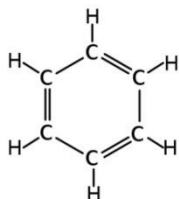
CYCLO PENTANE C_5H_{10}



CYCLO HEXANE C_6H_{12}

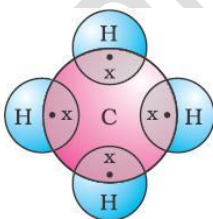


AROMATIC HYDROCARBON - BENZENE C_6H_6



ELECTRON DOT STRUCTURES

METHANE



ETHANE

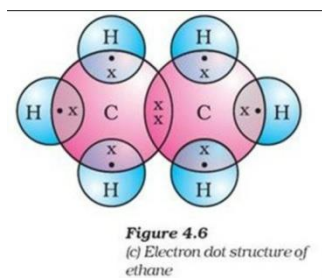
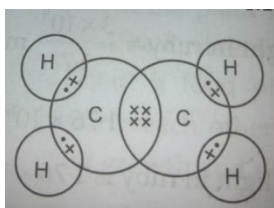
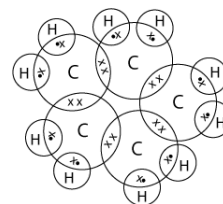


Figure 4.6
(c) Electron dot structure of ethane

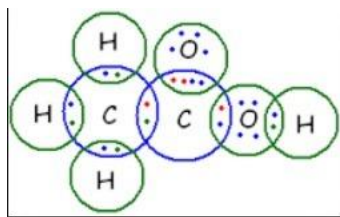
ETHENE



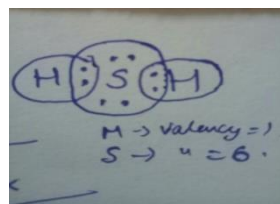
CYCLO PENTANE



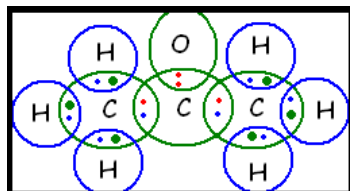
ETHANOIC ACID



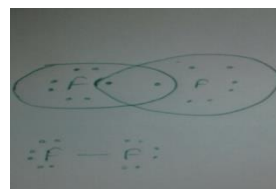
HYDROGEN SULPHIDE (H₂S)



PROPANONE



F₂



NOMENCLATURE OF ORGANIC COMPOUNDS

Functional group	Prefix/Suffix	Example
1. Halogen	Prefix-chloro, bromo, etc.	$\begin{array}{c} \text{H} & \text{H} & \text{H} \\ & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{Cl} \\ & & \\ \text{H} & \text{H} & \text{H} \end{array}$ Chloropropane
		$\begin{array}{c} \text{H} & \text{H} & \text{H} \\ & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{Br} \\ & & \\ \text{H} & \text{H} & \text{H} \end{array}$ Bromopropane
2. Alcohol	Suffix - ol	$\begin{array}{c} \text{H} & \text{H} & \text{H} \\ & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{OH} \\ & & \\ \text{H} & \text{H} & \text{H} \end{array}$ Propanol
3. Aldehyde	Suffix - al	$\begin{array}{c} \text{H} & \text{H} & \text{H} \\ & & \\ \text{H}-\text{C}-\text{C}-\text{C}=\text{O} \\ & & \\ \text{H} & \text{H} & \text{H} \end{array}$ Propanal
4. Ketone	Suffix - one	$\begin{array}{c} \text{H} & & \text{H} \\ & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ & & \\ \text{H} & \text{O} & \text{H} \end{array}$ Propanone
5. Carboxylic acid	Suffix - oic acid	$\begin{array}{c} \text{H} & \text{H} & \text{O} \\ & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{OH} \\ & & \\ \text{H} & \text{H} & \text{H} \end{array}$ Propanoic acid
6. Double bond (alkenes)	Suffix - ene	$\begin{array}{c} \text{H} & \text{H} & & \text{H} \\ & & & \\ \text{H}-\text{C}-\text{C}=\text{C} & & \text{H} \\ & & \\ \text{H} & & \text{H} \end{array}$ Propene
7. Triple bond (alkynes)	Suffix - yne	$\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{C}\equiv\text{C}-\text{H} \\ \\ \text{H} \end{array}$ Propyne

Periodic table of the elements

group	1*	2											13	14	15	16	17	18	
period	1	2											3	4	5	6	7	8	
1	1												5	6	7	8	9	10	
2	3	4											11	12	13	14	15	16	
3	11	12	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	
5	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	
6	55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	
7	87	88	89	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	
	Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og	

lanthanoid series	58	59	60	61	62	63	64	65	66	67	68	69	70	71
	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
actinoid series	90	91	92	93	94	95	96	97	98	99	100	101	102	103
	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

*Numbering system adopted by the International Union of Pure and Applied Chemistry (IUPAC).

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PERIODIC TRENDS IN THE MODERN PERIODIC TABLE

PERIODIC TREND	ACROSS A PERIOD (FROM LEFT TO RIGHT)	DOWN A GROUP (FROM TOP TO BOTTOM)
ATOMIC SIZE	Decreases	Increases
IONIZATION ENERGY	Increases	Decreases
METALLIC PROPERTY	Decreases	Increases
ELECTRO POSITIVITY	Decreases	Increases
ELECTRO NEGATIVITY	Increases	Decreases

PARTS OF BRAIN AND THEIR FUNCTIONS

	PARTS	FUNCTIONS
FORE BRAIN	Cerebrum	Speech, hearing, vision, taste, memory, logical thinking.
	Diencephalon Hypothalamus	Control body temperature, water level balancing, sleep, desire & control of pituitary gland.
MID-BRAIN		Transports message signals from hind brain to fore brain.
HIND-BRAIN	Pons	Facial expressions, chewing of food
	Cerebellum	Body balancing, walking, jumping
	Medulla	Involuntary actions like respiration, vomiting, salivation etc.,

HORMONES AND THEIR FUNCTIONS

HORMONES	FUNCTIONS
INSULIN	Regulates blood sugar level
ADRENALINE	Emergency hormone which prepares body in emergency situations by controlling different body parts & their functions.
TESTOSTERONE	Development of male sex organs
ESTROGEN	Development of female sex organs
THYROXINE	Regulates metabolism for body growth.

Five R's to save the environment

Refuse: say no to things people offer you that you don't need. Ex: say no to single use plastic carry bags.

Reduce: use less. Ex: save electricity by switching off unnecessary lights and fans.

Reuse: use things again and again. Ex: the plastic bottles of jams can be used for storing things in kitchen.

This is better than recycling because the process of recycling uses some energy.

Repurpose: when a product can no more be used for the original purpose, use it for some other useful purpose. Ex: cracked crockery can be used to grow small plants.

Recycle: collect plastic, paper, glass, metal items and recycle to make required things.

EXAM TIPS & INSTRUCTIONS



**“You don't have to be great to start, but you
have to start to be great”**

EXAM PREPARATION TIPS

- ❖ Set your goal
- ❖ Manage your time
- ❖ Identify your learning style
- ❖ Develop a study plan
- ❖ Keep up with reading
- ❖ Develop effective note-taking techniques
- ❖ Attend classes regularly
- ❖ Work with concentration
- ❖ Surround yourself with learning
- ❖ Use all your intelligence

ALL THE BEST