



केन्द्रीय विद्यालय संगठन
KENDRIYA VIDYALAYA SANGATHAN
An autonomous body under MoE, Govt of India

KVS REGIONAL OFFICE KOLKATA

KENDRIYA VIDYALAYA SANGATHAN

KVS RO KOLKATA

SESSION 2023-24

CLASS-X

STUDY MATERIAL (MLL)

OUR PATRONS

CHEIF PATRON- SH. Y ARUN KUMAR,
DEPUTY COMMISSIONER, KVS RO
KOLKATA

PATRON - SH. SANJIB SINHA,
ASSISTANT COMMISSIONER, KVS RO
KOLKATA

COORDINATORS-

1.SH. A. K. SINGH, PRINCIPAL,
KV COMMAND HOSPITAL, KOLKATA

2. SH. A. K. SHARMA, PRINCIPAL,
KV OF DUM DUM

3. SH. M.L. LOHAR, PRINCIPAL,
KV IIM JOKA

4. SH. SUDIP MANDAL, PRINCIPAL,
KV KHARAGPUR RAILWAY

COMPILED BY:

MRS. ELLORA SINHA, KV BAMANGACHI

MR. ANAND WARDHAN SHARMA, KV SANTRAGACHI

MISS. MEENU MAKHIJA, KV BARRACKPORE, AFS

CONTRIBUTED BY :

MRS. RASHMI EKKA

MR.NAIYAR SULAIMAN

MRS.SUDHA RAO

UMA VERMA

MRS. PRATIMA MAJHI

MRS. SAHELI GHOSH

MR NIRMAL CHAUDHARI

MS ANSARI NAZMINNAZ

MRS. JYOTI

MR. HRIDAY NATH PANDEY

SHWETA SONKAR

PREETI KUMARI

SANJAY SINGH

MR.RAM KUMAR RAJAK

MRS.BIJOY LAKSHMI BARMAN

MRS. KHUSHI MAJUMDER SIRCAR

MS.SWAPNA SAHOO

PRIYANKA SWAMI

MR. SUDARSAN CHAUDHURI

MR. SUMAN BARAI

MR. SUBRATA KUMAR PAUL

MS. RASHMITA SINGH

MRS KAVITA MECH

MRS. AMITA ROY

MRS MANJUSHRI RAIGURU

SUDHA KUMARI

MR. GOURHARI NANDI

MR.R.P. MAHATO

MRS. KANAKLATA MANDI

MR. JAYANTA BAKSHI

DAMINI PANDIT

MR. S.S. RAZI

MRS. SONALI PRASAD

MR. SANJAY KUMAR

MRS. ALAKA PATRA

MRS.BASUNDHARA

MRS PRIYANKA SHARMA

MS. GULSHAN JAHAN

MS. SUSMITA THAKUR

KUMARI SITAMANI MURMU

MRS. LIPIKA BISWAS

MR. KSHITISH CHANDRA SAHU

MRS. ANUSHREE PRASAD

MR. B.C. SARKAR

MRS. RINKY BAROI

MR. S.K. PATEL

MS SANYUKTA SHUKLA

MRS SIBANI MURMU

MR GOPAL SOREN

MR. A. K. MONDAL

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SCIENCE

(Code No. 086)

Classes: IX and X (2023-24)

The subject of Science plays an important role in developing well-defined abilities in cognitive, affective and psychomotor domains in children. It augments the spirit of enquiry, creativity, objectivity and aesthetic sensibility.

Upper primary stage demands that a number of opportunities should be provided to the students to engage them with the processes of Science like observing, recording observations, drawing, tabulation, plotting graphs, etc., whereas the secondary stage also expects abstraction and quantitative reasoning to occupy a more central place in the teaching and learning of Science. Thus, the idea of atoms and molecules being the building blocks of matter makes its appearance, as does Newton's law of gravitation.

The present syllabus has been designed around seven broad themes viz. Food; Materials; The World of The Living; How Things Work; Moving Things, People and Ideas; Natural Phenomenon and Natural Resources. Special care has been taken to avoid temptation of adding too many concepts than can be comfortably learnt in the given time frame. No attempt has been made to be comprehensive.

At this stage, while Science is still a common subject, the disciplines of Physics, Chemistry and Biology begin to emerge. The students should be exposed to experiences based on hands on activities as well as modes of reasoning that are typical of the subject.

General Instructions:

1. There will be an Annual Examination based on the entire syllabus.
2. The Annual Examination will be of 80 marks and 20 marks weightage shall be for Internal Assessment.
3. For Internal Assessment:
 - a. There will be Periodic Assessment that would include:
 - For 5 marks- Three periodic tests conducted by the school. Average of the best two tests to be taken that will have a weightage of 05 marks towards the final result.
 - For 5 marks- Diverse methods of assessment as per the need of the class dynamics and curriculum transaction. These may include - short tests, oral test, quiz, concept maps, projects, posters, presentations and enquiry based scientific investigations etc. and use rubrics for arguing them objectively. This will also have a weightage of 05 marks towards the final result.
 - b. Practical / Laboratory work should be done throughout the year and the student should maintain record of the same. Practical Assessment should be continuous. There will be weightage of 5 marks towards the final result. All practicals listed in the syllabus must be completed.
 - c. Portfolio to be prepared by the student- This would include classwork and other sample of student work and will carry a weightage of 5 marks towards the final results.

COURSE STRUCTURE

CLASS IX

(Annual Examination)

Marks: 80

Unit No.	Unit	Marks
I	Matter - Its Nature and Behaviour	25
II	Organization in the Living World	22
III	Motion, Force and Work	27
IV	Food; Food Production	06
	Total	80
	Internal assessment	20
	Grand Total	100

Theme: Materials

Unit I: Matter-Nature and Behaviour

Definition of matter; solid, liquid and gas; characteristics - shape, volume, density; change of state- melting (absorption of heat), freezing, evaporation (cooling by evaporation), condensation, sublimation.

Nature of matter: Elements, compounds and mixtures. Heterogeneous and homogenous mixtures, colloids and suspensions. Physical and chemical changes (excluding separating the components of a mixture).

Particle nature and their basic units: Atoms and molecules, Law of Chemical Combination, Chemical formula of common compounds, Atomic and molecular masses.

Structure of atoms: Electrons, protons and neutrons, Valency, Atomic Number and Mass Number, Isotopes and Isobars.

Theme: The World of the Living

Unit II: Organization in the Living World

Cell - Basic Unit of life : Cell as a basic unit of life; prokaryotic and eukaryotic cells, multicellular organisms; cell membrane and cell wall, cell organelles and cell inclusions; chloroplast, mitochondria, vacuoles, endoplasmic reticulum, Golgi apparatus; nucleus, chromosomes - basic structure, number.

Tissues, Organs, Organ System, Organism:

Structure and functions of animal and plant tissues (only four types of tissues in animals; Meristematic and Permanent tissues in plants).

Theme: Moving Things, People and Ideas

Unit III: Motion, Force and Work

Motion: Distance and displacement, velocity; uniform and non-uniform motion along a straight line; acceleration, distance-time and velocity-time graphs for uniform motion and uniformly accelerated motion, elementary idea of uniform circular motion.

Force and Newton's laws : Force and Motion, Newton's Laws of Motion, Action and Reaction forces, Inertia of a body, Inertia and mass, Momentum, Force and Acceleration.

Gravitation: Gravitation; Universal Law of Gravitation, Force of Gravitation of the earth (gravity), Acceleration due to Gravity; Mass and Weight; Free fall.

Floatation: Thrust and Pressure. Archimedes' Principle; Buoyancy.

Work, Energy and Power: Work done by a Force, Energy, power; Kinetic and Potential energy; Law of conservation of energy (excluding commercial unit of Energy).

Sound: Nature of sound and its propagation in various media, speed of sound, range of hearing in humans; ultrasound; reflection of sound; echo.

Theme: Food

Unit IV: Food Production

Plant and animal breeding and selection for quality improvement and management; Use of fertilizers and manures; Protection from pests and diseases; Organic farming.

Note for the Teachers:

1. The chapter Natural Resources (NCERT Chapter 14) will not be assessed in the year-end examination. However, learners may be assigned to read this chapter and encouraged to prepare a brief write up on any concept of this chapter in their Portfolio. This may be for Internal Assessment and credit may be given for Periodic Assessment/Portfolio.
2. The NCERT text books present information in boxes across the book. These help students to get conceptual clarity. However, the information in these boxes would not be assessed in the year-end examination.

PRACTICALS

Practicals should be conducted alongside the concepts taught in theory classes.

(LIST OF EXPERIMENTS)

1. Preparation of: **Unit-I**
 - a) a true solution of common salt, sugar and alum
 - b) a suspension of soil, chalk powder and fine sand in water
 - c) a colloidal solution of starch in water and egg albumin/milk in water and distinguish between these on the basis of

- transparency
- filtration criterion
- stability

- Preparation of **Unit-I**
 - A mixture
 - A compound

using iron filings and sulphur powder and distinguishing between these on the basis of:

 - appearance, i.e., homogeneity and heterogeneity
 - behaviour towards a magnet
 - behaviour towards carbon disulphide as a solvent
 - effect of heat
- Perform the following reactions and classify them as physical or chemical changes: **Unit-I**
 - Iron with copper sulphate solution in water
 - Burning of magnesium ribbon in air
 - Zinc with dilute sulphuric acid
 - Heating of copper sulphate crystals
 - Sodium sulphate with barium chloride in the form of their solutions in water
- Preparation of stained temporary mounts of (a) onion peel, (b) human cheek cells & to record observations and draw their labeled diagrams. **Unit-II**
- Identification of Parenchyma, Collenchyma and Sclerenchyma tissues in plants, striped, smooth and cardiac muscle fibers and nerve cells in animals, from prepared slides. Draw their labeled diagrams. **Unit-II**
- Determination of the melting point of ice and the boiling point of water. **Unit-I**
- Verification of the Laws of reflection of sound. **Unit-III**
- Determination of the density of solid (denser than water) by using a spring balance and a measuring cylinder. **Unit-III**
- Establishing the relation between the loss in weight of a solid when fully immersed in **Unit-III**
 - Tap water
 - Strongly salty water with the weight of water displaced by it by taking at least two different solids.
- Determination of the speed of a pulse propagated through a stretched string/slinky (helical spring). **Unit-III**
- Verification of the law of conservation of mass in a chemical reaction. **Unit-III**

COURSE STRUCTURE
CLASS X
(Annual Examination)

Marks: 80

Unit No.	Unit	Marks
I	Chemical Substances-Nature and Behaviour	25
II	World of Living	25
III	Natural Phenomena	12
IV	Effects of Current	13
V	Natural Resources	05
	Total	80
	Internal assessment	20
	Grand Total	100

Theme: Materials

Unit I: Chemical Substances - Nature and Behaviour

Chemical reactions: Chemical equation, Balanced chemical equation, implications of a balanced chemical equation, types of chemical reactions: combination, decomposition, displacement, double displacement, precipitation, endothermic exothermic reactions, oxidation and reduction.

Acids, bases and salts: Their definitions in terms of furnishing of H⁺ and OH⁻ ions, General properties, examples and uses, neutralization, concept of pH scale (Definition relating to logarithm not required), importance of pH in everyday life; preparation and uses of Sodium Hydroxide, Bleaching powder, Baking soda, Washing soda and Plaster of Paris.

Metals and nonmetals: Properties of metals and non-metals; Reactivity series; Formation and properties of ionic compounds; Basic metallurgical processes; Corrosion and its prevention.

Carbon compounds: Covalent bonding in carbon compounds. Versatile nature of carbon. Homologous series. Nomenclature of carbon compounds containing functional groups (halogens, alcohol, ketones, aldehydes, alkanes and alkynes), difference between saturated hydro carbons and unsaturated hydrocarbons. Chemical properties of carbon compounds (combustion, oxidation, addition and substitution reaction). Ethanol and Ethanoic acid (only properties and uses), soaps and detergents.

Theme: The World of the Living

Unit II: World of Living

Life processes: 'Living Being'. Basic concept of nutrition, respiration, transport and excretion in plants and animals.

Control and co-ordination in animals and plants: Tropic movements in plants; Introduction of plant hormones; Control and co-ordination in animals: Nervous system; Voluntary, involuntary and reflex action; Chemical co-ordination: animal hormones.

Reproduction: Reproduction in animals and plants (asexual and sexual) reproductive health - need and methods of family planning. Safe sex vs HIV/AIDS. Child bearing and women's health.

Heredity and Evolution: Heredity; Mendel's contribution- Laws for inheritance of traits: Sex determination: brief introduction: (topics excluded - evolution; evolution and classification and evolution should not be equated with progress).

Theme: Natural Phenomena

Unit III: Natural Phenomena

Reflection of light by curved surfaces; Images formed by spherical mirrors, centre of curvature, principal axis, principal focus, focal length, mirror formula (Derivation not required), magnification.

Refraction; Laws of refraction, refractive index.

Refraction of light by spherical lens; Image formed by spherical lenses; Lens formula (Derivation not required); Magnification. Power of a lens.

Functioning of a lens in human eye, defects of vision and their corrections, applications of spherical mirrors and lenses.

Refraction of light through a prism, dispersion of light, scattering of light, applications in daily life (excluding colour of the sun at sunrise and sunset).

Theme: How Things Work

Unit IV: Effects of Current

Electric current, potential difference and electric current. Ohm's law; Resistance, Resistivity, Factors on which the resistance of a conductor depends. Series combination of resistors, parallel combination of resistors and its applications in daily life. Heating effect of electric current and its applications in daily life. Electric power, Interrelation between P, V, I and R. **Magnetic effects of current** : Magnetic field, field lines, field due to a current carrying conductor, field due to current carrying coil or solenoid; Force on current carrying conductor, Fleming's Left Hand Rule, Direct current. Alternating current: frequency of AC. Advantage of AC over DC. Domestic electric circuits.

Theme: Natural Resources

Unit V: Natural Resources

Our environment: Eco-system, Environmental problems, Ozone depletion, waste production and their solutions. Biodegradable and non-biodegradable substances.

Note for the Teachers:

1. The chapter Management of Natural Resources (NCERT Chapter 16) will not be assessed in the year-end examination. However, learners may be assigned to read this chapter and encouraged to prepare a brief write up to any concept of this chapter in their Portfolio. This

may be for Internal Assessment and credit may be given Periodic Assessment/Portfolio).

- The NCERT text books present information in boxes across the book. These help students to get conceptual clarity. However, the information in these boxes would not be assessed in the year-end examination.

PRACTICALS

Practical should be conducted alongside the concepts taught in theory classes.

LIST OF EXPERIMENTS

- A. Finding the pH of the following samples by using pH paper/universal indicator: **Unit-I**
 - Dilute Hydrochloric Acid
 - Dilute NaOH solution
 - Dilute Ethanoic Acid solution
 - Lemon juice
 - Water
 - Dilute Hydrogen Carbonate solution

B. Studying the properties of acids and bases (HCl & NaOH) on the basis of their reaction with: **Unit-I**

 - Litmus solution (Blue/Red)
 - Zinc metal
 - Solid sodium carbonate
- Performing and observing the following reactions and classifying them into: **Unit-I**
 - Combination reaction
 - Decomposition reaction
 - Displacement reaction
 - Double displacement reaction
 - Action of water on quicklime
 - Action of heat on ferrous sulphate crystals
 - Iron nails kept in copper sulphate solution
 - Reaction between sodium sulphate and barium chloride solutions
- Observing the action of Zn, Fe, Cu and Al metals on the following salt solutions: **Unit-I**
 - $\text{ZnSO}_4(\text{aq})$
 - $\text{FeSO}_4(\text{aq})$
 - $\text{CuSO}_4(\text{aq})$
 - $\text{Al}_2(\text{SO}_4)_3(\text{aq})$

Arranging Zn, Fe, Cu and Al (metals) in the decreasing order of reactivity based on the above result.
- Studying the dependence of potential difference (V) across a resistor on the current (I) passing through it and determine its resistance. Also plotting a graph between V and I. **Unit-IV**
- Determination of the equivalent resistance of two resistors when connected in series and parallel. **Unit-IV**
- Preparing a temporary mount of a leaf peel to show stomata. **Unit- II**

7. Experimentally show that carbon dioxide is given out during respiration. **Unit-II**
8. Study of the following properties of acetic acid (ethanoic acid): **Unit- I**
- i) Odour
 - ii) solubility in water
 - iii) effect on litmus
 - iv) reaction with Sodium Hydrogen Carbonate
9. Study of the comparative cleaning capacity of a sample of soap in soft and hard water. **Unit- I**
10. Determination of the focal length of: **Unit-III**
- i) Concave mirror
 - ii) Convex lens
- by obtaining the image of a distant object.
11. Tracing the path of a ray of light passing through a rectangular glass slab for different angles of incidence. Measure the angle of incidence, angle of refraction, angle of emergence and interpret the result. **Unit - III**
12. Studying (a) binary fission in *Amoeba*, and (b) budding in yeast and Hydra with the help of prepared slides. **Unit-II**
13. Tracing the path of the rays of light through a glass prism. **Unit-III**
14. Identification of the different parts of an embryo of a dicot seed (Pea, gram or red kidney bean). **Unit-II**

PRESCRIBED BOOKS:

- Science-Textbook for class IX-NCERT Publication
- Science-Text book for class X- NCERT Publication
- Assessment of Practical Skills in Science-Class IX - CBSE Publication
- Assessment of Practical Skills in Science- Class X- CBSE Publication
- Laboratory Manual-Science-Class IX, NCERT Publication
- Laboratory Manual-Science-Class X, NCERT Publication
- Exemplar Problems Class IX – NCERT Publication
- Exemplar Problems Class X – NCERT Publication

Theory (80 marks)

Question Paper Design

(Class X)

Subject: Science

Competencies	Total
Demonstrate Knowledge and Understanding	46 %
Application of Knowledge/Concepts	22 %
Formulate, Analyze, Evaluate and Create	32 %
	100%

Note:

- Typology of Questions: VSA including objective type questions, Assertion – Reasoning type questions; SA; LA; Source-based/ Case-based/ Passage-based/ Integrated assessment questions.
- An internal choice of approximately 33% would be provided.

Internal Assessment (20 Marks)

- **Periodic Assessment** - 05 marks + 05 marks
- **Subject Enrichment** (Practical Work) - 05 marks
- **Portfolio** - 05 marks

Suggestive verbs for various competencies

- **Demonstrate Knowledge and Understanding**
 - State, name, list, identify, define, suggest, describe, outline, summarize, etc.
- **Application of Knowledge/Concepts**
 - Calculate, illustrate, show, adapt, explain, distinguish, etc.
- **Formulate, Analyze, Evaluate and Create**
 - Interpret, analyze, compare, contrast, examine, evaluate, discuss, construct, etc.

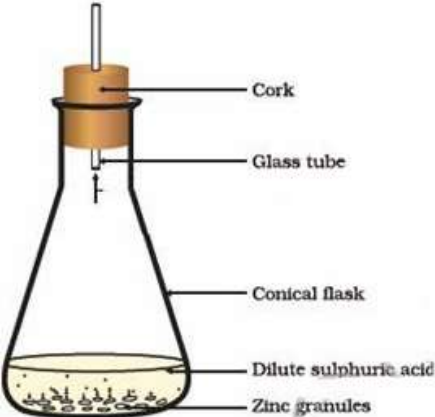
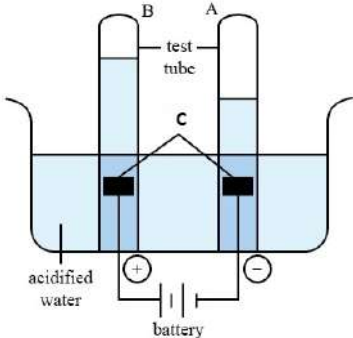
CHAPTER 1
CHEMICAL REACTIONS AND EQUATIONS

Q. NO.	SECTION A (MULTIPLE CHOICE QUESTIONS)	MARKS
1.	Identify the type of reaction: $H_2 + Cl_2 \rightarrow 2HCl$ a) Displacement reaction b) Double decomposition reaction c) Combination reaction d) Decomposition reaction	1
ANS	c) Combination reaction	
2.	On adding water to quicklime we get a) $Ca(OH)_2$ b) $CaCO_3$ c) CaO d) $Ca(HCO_3)_2$	1
ANS	a) $Ca(OH)_2$	
3.	Magnesium metal burns in air with dazzling white flame. The type of chemical reaction seen is a) combination reaction b) decomposition reaction c) displacement reaction d) double decomposition reaction	1
ANS	a) combination reaction	
4.	How many water molecules are present in a crystal of ferrous sulphate molecule? a) 5 b) 7 c) 2 d) 3	1
ANS	b) 7	
5.	Which one of the following is a decomposition reaction? a) $Zn(s) + CuSO_4(aq) \rightarrow ZnSO_4(aq) + Cu(s)$ b) $BaCl_2(s) + Na_2SO_4(s) \rightarrow BaSO_4(s) + 2NaCl(s)$ c) $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$ d) $C(s) + O_2(g) \rightarrow CO_2(g)$	1
ANS	c) $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$	
6.	Which of the following is an exothermic reaction? a) electrolysis of water b) cellular respiration c) process of photosynthesis d) conversion of lime stone into quicklime	1
ANS	b) cellular respiration	
7.	Which of the given chemical equations is balanced?	1


CHAPTER 1
CHEMICAL REACTIONS AND EQUATIONS

	a) $\text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{O} + \text{O}_2$ b) $\text{NaNO}_3 \rightarrow \text{NaNO}_2 + \text{O}_2$ c) $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ d) $\text{Al}_2\text{CO}_3 \rightarrow \text{Al}_2\text{O}_3 + \text{CO}_2$	
ANS	c) $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$	
8.	Which of the following gases is used to store fat and oil-containing foods for a long time? a) Carbon dioxide b) Oxygen c) Nitrogen d) Neon	1
ANS	(c) Nitrogen	
9.	Fatty foods become rancid due to the process of a) oxidation b) corrosion c) reduction d) hydrogenation	1
ANS	(a) oxidation	
10.	A student while heating solid lead nitrate taken in a test tube would observe: a) white residue of PbO_2 b) green residue of NO_2 c) yellow residue of PbO d) brown residue of NO	1
ANS	c) yellow residue of PbO	
ASSERTION REASONING QUESTIONS: (QN NO 11-13)		
Assertion: (A). Reason: (R) CHOOSE THE CORRECT OPTION AS PER THE STATEMENTS GIVEN IN ASSERTION AND REASON: a) Assertion and Reason both are correct and R is the correct explanation of A. b) Assertion and Reason both are correct but R is not the correct explanation of A. c) Assertion is true but Reason is false. d) Assertion is false but Reason is true.		
11.	Assertion (A): Iron articles are painted so as to prevent them from rusting. Reason (R): When the surface of iron is coated with paint, its surface does not come in contact with oxygen and moisture therefore rusting does not take place.	1
ANS	a) Assertion and Reason both are correct and R is the correct explanation of A.	
12.	Assertion (A): Photosynthesis is considered as an endothermic reaction. Reason (R): Energy gets released in the process of photosynthesis	1

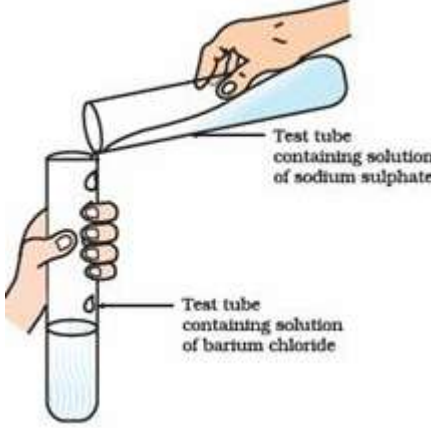
CHAPTER 1
CHEMICAL REACTIONS AND EQUATIONS

ANS	c) Assertion is true but Reason is false.	
	SECTION -B: PICTORIAL, KNOWLEDGE AND UNDERSTANDING (QN NO 13-17)	
13.	 <p>Dil. HCl is added to Zn granules.” How will you prove that chemical change has taken place here? Support your response with two arguments.</p>	
ANS	<p>The chemical reaction is taking place as (any two)</p> <ul style="list-style-type: none"> · bubbles are formed because of evolution of gases · Change in colour (Zn - silvery grey to black) · Change in temperature 	1+1
14.	 <p>Observe the above diagram and answer the questions:</p> <ol style="list-style-type: none"> i) Identify the gases evolved at test A and test B. ii) Why are the amounts of gases collected in the two test tubes are not of the same volume? 	
ANS	<ol style="list-style-type: none"> i) At test tube A oxygen gas is evolved and at test tube B hydrogen gas is evolved. ii) The amounts of gases collected in the two test tubes are not of the same volume because in water, hydrogen and oxygen are present in the ratio of 2:1 by mass. 	1 + 1
15.	<ol style="list-style-type: none"> a) Identify the substance that is oxidized and reduced in the reaction: $\text{CuO (s) + Zn (s) } \rightarrow \text{Cu (s) + ZnO (s)}$ b) Identify the oxidizing agent and reducing agent in the reaction: $3\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$ 	
	<ol style="list-style-type: none"> a) oxidized- Zn reduced - CuO b) oxidizing agent- H₂O 	1+ 1


CHAPTER 1
CHEMICAL REACTIONS AND EQUATIONS

	reducing agent- Fe	
16.	“We need to balance a skeletal chemical equation.” Give reason to justify the statement.	
ANS	Skeletal chemical equations are unbalanced. We need to balance chemical equation because of law of conservation of mass. It states that ‘matter can neither be created nor be destroyed’. Therefore, chemical equation must be balanced in each and every chemical reaction.	2
17.	State reason for the following: a) Potato chips manufactures fill the packets with nitrogen gas. b) Iron articles are shiny when new but coated with reddish brown powder when left for some time.	
ANS	a) Potato chips manufactures fill the packets with nitrogen gas to prevent rancidity. b) Due to corrosion or rusting.	2
	SECTION -C : APPLICATION,EVALUATE,KNOWLEDGE AND ANALYSIS:(Q NO: 18-22)	
18.	The following diagram displays a chemical reaction. Observe carefully and answer the following questions  <p style="text-align: center;">(a) Identify the type of chemical reaction that will take place and define it. How will the colour of the salt change? (b) Write the chemical equation of the reaction that takes place. (c) Mention one commercial use of this salt.</p>	1+1+1
Ans	(a) Photochemical decomposition reaction: Those reactions in which a compound breaks down into simple substances in presence of light are called photochemical decomposition reaction. The colour of salt will change from white to grey. (b) $2\text{AgCl(s)} \xrightarrow{\text{Sunlight}} 2\text{Ag} + \text{Cl}_2$ (c) Silver chloride is used in photography.	
19.	State the type of chemical reactions and chemical equations that take place in the following: (i) Magnesium wire is burnt in air. (ii) Electric current is passed through water. (iii) Ammonia and hydrogen chloride gases are mixed.	1+1+1
Ans		

CHAPTER 1
CHEMICAL REACTIONS AND EQUATIONS

	<p>(i) $2\text{Mg(s)} + \text{O}_2\text{(g)} \longrightarrow 2\text{MgO(s)}$ Combination reaction (Redox reaction)</p> <p>(ii) $2\text{H}_2\text{O(l)} \xrightarrow{\text{Electrolysis}} 2\text{H}_2\text{(g)} + \text{O}_2\text{(g)}$ Electrical decomposition reaction.</p> <p>(iii) $\text{NH}_3\text{(g)} + \text{HCl(g)} \longrightarrow \text{NH}_4\text{Cl(s)}$ Combination Reaction.</p>	
20.	 <p>Observe the given figure above and answer the following:</p> <p>i) Write the complete balanced equation for the above. ii) What type of reaction is involved? iii) Name and write the colour of the precipitate formed.</p>	1+1+1
Ans	<p>i) $\text{BaCl}_2\text{(aq)} + \text{Na}_2\text{SO}_4\text{(aq)} \rightarrow \text{BaSO}_4\text{(s)} + 2\text{NaCl(aq)}$ ii) Double displacement reaction. iii) barium sulphate, (BaSO_4), White colour precipitate is obtained.</p>	
21.	<p>i) Define corrosion. ii) Why corrosion of iron is a serious problem? iii) How can we prevent corrosion?</p>	1+1+1
Ans	<p>i) It is an undesirable change that occurs in metals, when they are attacked by moisture, air, acids and bases. ii) Every year an enormous amount of money is spent to replace damaged iron. iii) Painting, galvanisation, electroplating, oiling, alloying.</p>	
22.	<p>Give one example of each decomposition reaction and write balanced chemical equation which is carried in the presence of:</p> <p>i) electrical energy, ii) sunlight, iii) heat energy.</p>	1+1+1
Ans	<p>i) electrolysis of water, $2\text{H}_2\text{O(l)} \rightarrow 2\text{H}_2\text{(g)} + \text{O}_2\text{(g)}$ ii) decomposition of silver bromide, $2\text{AgBr(s)} \rightarrow 2\text{Ag(s)} + \text{Br}_2\text{(g)}$ iii) decomposition of calcium carbonate, $\text{CaCO}_3\text{(s)} \rightarrow \text{CaO(s)} + \text{CO}_2\text{(g)}$</p>	
SECTION -D: CASE BASED QUESTIONS: (Q NO: 23- 24)		
23.	<p>A chemistry teacher demonstrated an experiment to the students of her class. In her experiment, she added an iron nail to a blue coloured solution taken in a beaker and kept it for 15 minutes. After 15 minutes, students observed that blue coloured solution fades.</p>	4

CHAPTER 1
CHEMICAL REACTIONS AND EQUATIONS

	<p>i) Identify the blue coloured solution and write its chemical formula. ii) Name the type of chemical reaction taking place in a beaker. iii) Give reason behind decolouration of blue solution. Write the equation involved in the reaction.</p>	
	<p>i) Copper sulphate solution, CuSO_4 ii) Displacement reaction iii) Iron is more reactive than copper. So, it displaces copper from copper sulphate solution (blue) and forms iron sulphate which is green in colour. $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$</p>	
24.	 <p>Anil learns about combination reactions and spends a day long in the lab figuring out if they absorb or release heat. He performs an experiment in which he adds water to quicklime in a beaker.</p> <p>(i) How will he confirm that heat is absorbed or released in this experiment (ii) Which of the following reactions is endothermic reaction? a. Photosynthesis b. Respiration c. Corossion d. Digestion (iii) Identify the following reaction as endothermic and exothermic reaction. Justify it? (a)The combination of nitrogen and oxygen gases to form nitric oxide (b)The decomposition of vegetable matter into compost</p>	4
	<p>(i) By touching the beaker. Beaker is hot as this reaction is exothermic. (ii)Photosynthesis (iii) a) endothermic reaction, because heat is absorbed. b) exothermic reaction , because heat is evolved</p>	
SECTION – E: LONG ANSWER QUESTIONS:(Q NO: 25)		
25.	<p>a) Define rancidity. b) List two changes which take place when oily food become rancid. c) Explain any three methods to prevent rancidity.</p>	5
	<p>a) Undesirable change that takes place in oil containing food items due to the oxidation of fatty acids. b) smells badly/ has a bad taste</p>	

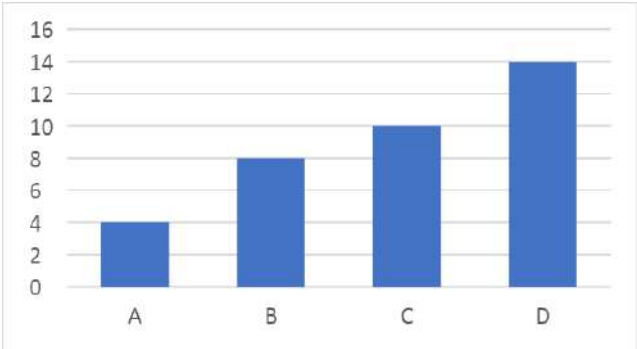
CHAPTER 1
CHEMICAL REACTIONS AND EQUATIONS

	<p>c) (i) Adding antioxidants to the food materials. (ii) Storing food in air tight container (iii) Flushing out air with nitrogen gas. (iv) Refrigeration (any three)</p>	
	<p>Important Video link</p>	
	<p>CBSE Class 10 Science - 1 Chemical Reactions and Equations Full Chapter by Shiksha House - YouTube</p>	
	<p>Short cut Tips/ concept map</p>	
	<p>i) Combination reaction A single product is formed from two or more reactants. $\text{CaO(s)} + \text{H}_2\text{O(l)} \rightarrow \text{Ca(OH)}_2 \text{(aq)}$</p> <p>ii) Decomposition reaction A single reactant breaks down to yield two or more products. a) Thermal decomposition $\text{CaCO}_3\text{(s)} \rightarrow \text{CaO (s)} + \text{CO}_2 \text{(g)}$ b) Electrolytic decomposition $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$ c) Photolytic decomposition $2\text{AgBr} \rightarrow 2\text{Ag} + \text{Br}_2$</p> <p>iii) Displacement reaction One element is displaced by another element. $\text{Fe(s)} + \text{CuSO}_4\text{(aq)} \rightarrow \text{FeSO}_4 + \text{Cu(s)}$</p> <p>iv) Double displacement reaction Exchange of ions between reactants. $\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4\text{(s)} + 2\text{NaCl}$</p> <p>v) Redox reaction Both oxidation and reduction take place simultaneously</p> <div style="text-align: center;"> <p style="text-align: center;"> $\text{CuO} + \text{H}_2 \xrightarrow{\text{Heat}} \text{Cu} + \text{H}_2\text{O}$ </p> </div> <p>Oxidation: Oxidation is the gain of oxygen or loss of hydrogen eg. $2\text{Cu} + \text{O}_2 \xrightarrow{\text{Heat}} 2\text{CuO}$ When copper is heated a black colour appears. If this CuO is reacted with hydrogen gas then again Cu becomes brown as reverse reaction takes place $\text{CuO} + \text{H}_2 \xrightarrow{\text{Heat}} \text{Cu} + \text{H}_2\text{O}$</p> <p>Reduction : Reduction is the loss of oxygen or gain of hydrogen</p> <p>vi) . Exothermic reaction: A chemical reaction in which heat energy is evolved. $\text{C} + \text{O}_2 \rightarrow \text{CO}_2 \text{(g)} + \text{heat}$</p> <p>vii) Endothermic reaction: A chemical reaction in which heat energy is absorbed. $\text{ZnCO}_3 + \text{Heat} \rightarrow \text{ZnO} + \text{CO}_2$</p>	

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CHEMICAL REACTIONS AND EQUATIONS

	<p>Corrosion: When a metal is attacked by substances around it, such as moisture, acids etc. e.g. Reddish brown coating on iron. (ii) Black coating on Silver.</p> <p>Corrosion (rusting) of iron: $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$ (Hydrated iron oxide)</p> <p>Corrosion of copper: $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$ (Basic copper carbonate)</p> <p>Corrosion of silver: Ag_2S (Silver sulphide)</p> <p>Corrosion of Aluminium: Al_2O_3 (Aluminium oxide)</p>	
	<p>Rancidity: Phenomenon where fats and oil containing food is oxidised, they become rancid and their smell and taste change.</p> <p>Preventive methods</p> <ol style="list-style-type: none"> (1) Adding antioxidants to the food materials. (2) Storing food in air tight container (3) Flushing out air with nitrogen gas. (4) Refrigeration 	
CONCEPT MAP		
	<p>Chemical Reactions and Equations</p> <ul style="list-style-type: none"> Types of Chemical Reactions <ul style="list-style-type: none"> * Combination reaction * Decomposition reaction * Displacement reaction * Double displacement reaction * Redox reaction Corrosion <ul style="list-style-type: none"> When reactive metal surface is attacked by air, or water Rancidity <ul style="list-style-type: none"> Process of oxidation of fats or oil Heat exchange <ul style="list-style-type: none"> Exothermic reaction Endothermic reaction Chemical Reaction <ul style="list-style-type: none"> Characteristics <ul style="list-style-type: none"> Change in state Change in colour Change in temperature Evolution of a gas Represented by Chemical Equation Chemical Equation <ul style="list-style-type: none"> Reactants \rightarrow Products ↓ Balanced Chemical Equation <ul style="list-style-type: none"> Follows law of conservation of mass Number of atoms remains on both sides of the reaction 	

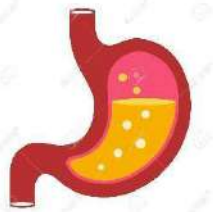
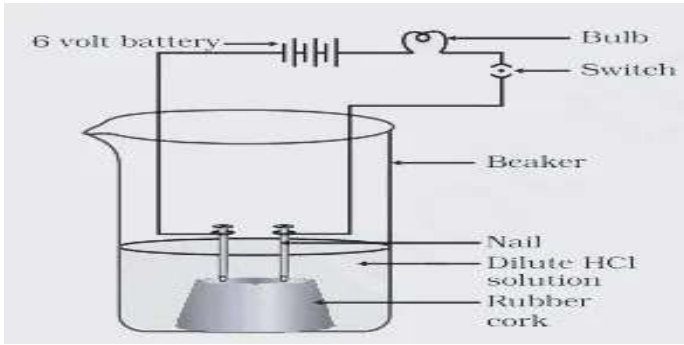
CHAPTER 2
ACIDS, BASES AND SALTS

Q NO.	SECTION -A: MULTIPLE CHOICE QUESTIONS (QN NO 1-10)	MARK S
1.	<p>The graph given below shows the pH values of four different chemicals A, B, C and D. Which of the following is least acidic?</p>  <p>(a) A (b) B (c) C (d) D</p>	1
ANS	(d) D	
2.	<p>The acid having highest hydrogen ion concentration is one with (a) pH = 2.5 (b) pH = 7 (c) pH = 1.4 (d) pH = 12</p>	1
ANS	(c) pH = 1.4	
3.	<p>An aqueous solution turns red litmus solution blue. Excess addition of which of the following solution would reverse the change?</p> <p>(a) Baking powder (b) Lime (c) Ammonium hydroxide solution (d) Hydrochloric acid</p>	1
ANS	(d) Hydrochloric acid	
4.	<p>Sodium hydroxide turns phenolphthalein solution</p> <p>(a) pink (b) yellow (c) colourless (d) orange</p>	1
ANS	(a) pink	
5.	<p>A student added a metal powder to dilute HCl and dilute NaOH solution in two separate test tubes. He noticed gas bubbles in both the test tubes. When he brought a burning candle near the mouth of both the test tubes, the gas burns with pop sound. The metal powder used may be</p> <p>(a) Cu (b) Zn</p>	1

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	(c) Fe (d) Ca	
ANS	(b) Zn	
6.	At what temperature is gypsum heated to form Plaster of Paris? (a) 90°C (b) 100°C (c) 110°C (d) 120°C	1
ANS	(b) 100°C	
7.	Which of the following types of medicine is used for treating indigestion caused by over eating? (a) Antibiotic (b) Analgesic (c) Antiseptic (d) Antacid	1
ANS	(d) Antacid	
8.	Stinging hair of nettle leaves inject a chemical which causes burning pain. This chemical is a) Ethanoic acid b) Methanoic acid c) Oxalic acid d) Tartaric acid	1
ANS	a) Methanoic acid	
9.	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	1
ANS	(b) Sodium zincate and hydrogen gas	
10.	The acid produced naturally in the stomach is: (a) Acetic Acid (b) Citric acid (c) Hydrochloric Acid (d) Sulphuric Acid	1
ANS	(c) Hydrochloric Acid	
ASSERTION REASONING QUESTIONS: (QN NO 11-12)		
	Assertion: (A). Reason: (R) CHOOSE THE CORRECT OPTION AS PER THE STATEMENTS GIVEN IN ASSERTION AND REASON: a) Assertion and Reason both are correct and R is the correct explanation of A. b) Assertion and Reason both are correct but R is not the correct explanation of A. c) Assertion is true but Reason is false. d) Assertion and Reason both are incorrect.	
11.	Assertion (A) : The acid must always be added to water with constant stirring. Reason (R) : Mixing of an acid with water decreases the concentration of H ⁺ ions per unit volume.	1

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ANS	b) Assertion and Reason both are correct but R is not the correct explanation of A.	
12.	(A) Plaster of Paris is stored in a moisture proof container. (R) Plaster of Paris sets into a hard mass on wetting with water to form calcium sulphate hemihydrate.	1
ANS	a) Assertion and Reason both are correct and R is the correct explanation of A.	
SECTION -B: PICTORIAL, KNOWLEDGE AND UNDERSTANDING (QN NO 13-17)		
13.	A housewife found that the cake prepared by her is hard and small. Which ingredient has she forgotten to add that would have made the cake fluffy ? Give reasons	2
ANS	The most important ingredient must be added while making cake is baking soda, It helps to make the cake fluffy by producing carbon dioxide in the cake when it is heated and leaves small holes (bubbles) in it. Hence, the ingredient that she has forgotten to add that makes the cake fluffy is baking soda.	
14.	 <p>Ayush was suffering from stomach pain for a number of days. He consulted a doctor who advised him to take two antacid tablets after each meal for about a week and avoid spicy food. Ayush followed the advise strictly and was cured. What was the problem faced by Ayush? Give one example of an antacid and write its chemical formula.</p>	2
ANS	Ayush was suffering from acidity. e.g. – Milk of Magnesia, $Mg(OH)_2$	
15.	 <p>In the above experiment if we use glucose or alcohol in place of dilute HCl will the bulb glow? Justify</p>	2
ANS	The bulb will start glowing in the case of acids but glucose and alcohol solutions do not conduct electricity because they do not produce ions in water.	

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	The glowing bulb indicates that there is a flow of electric current through the solution. The electric current is carried through the solution by ions.	
16.	What happens when nitric acid is added to an egg-shell? Justify your answer.	2
ANS	CO ₂ gas is evolved. Egg shell contains CaCO ₃ which on reactions with HNO ₃ release CO ₂ .	
17.	Salt 'A' commonly used in bakery products on heating gets converted into another salt 'B' which itself is used for removal of hardness of water a gas 'C' is evolved. The gas 'C' when passed through lime water, it turns milky. Identify 'A', 'B' and 'C'.	2
ANS	The salt A is sodium hydrogen carbonate (baking soda) and is commonly used in bakeries as a constituent of baking powder. Upon heating, it changes to sodium carbonate B and evolves carbon dioxide gas C. Sodium carbonate removes hardness from water, while CO ₂ gas turns lime water milky.	
	SECTION -C : APPLICATION,EVALUATE,KNOWLEDGE AND ANALYSIS:(Q NO: 18-22)	
18.	A student observes that a young child while playing on the swing is stung by a wasp. She started crying. Her teacher immediately applied some white paste on the stung area. Name the white substance and why did her teacher apply it on the affected area?	3
ANS	The white substance applied by the teacher is baking soda. Baking soda is basic in nature and neutralizes the acid of ant sting.	
19.	A compound which is prepared from gypsum has the property of hardening when mixed with proper quantity of water. (i) Identify the compound. (ii) Write the chemical equation for its preparation. (iii) Mention one important use of this compound.	3
ANS	(i) Plaster of Paris (ii) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O} \xrightarrow{\quad} \text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O} + 1\frac{1}{2}\text{H}_2\text{O}$ By heating Gypsum at 373K (iii) For making fire proof materials, for setting fractured bones, for making cast of statues, models, toys.	
20.	Give reasons why: (i) Tap water conducts electricity whereas distilled water does not. (ii) For a dilution of acid, acid is added into water and not water into acid. (iii) On strong heating, blue coloured copper sulphate crystals turns white.	3
ANS	(i) Tap water contains ions which conduct electricity, distilled water does not contain ions. (ii) Adding water to acid is highly exothermic. Therefore, water is added to acid very slowly with cooling. (iii) Due to loss of water of crystallization.	

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21.	A dry pellet of a common base B absorbs moisture and turns sticky when kept open. The compound is also a by-product of the chlor-alkali process. Identify B. What type of reaction occurs when B is treated with an acidic oxide? Write a balanced chemical equation for one such solution	3
ANS	Sodium hydroxide (NaOH) is a commonly used base and is hygroscopic; it absorbs moisture from the atmosphere and becomes sticky. A neutralisation reaction occurs when acidic oxides react with the base to give salt and water. $2 \text{NaOH} + \text{CO}_2 \rightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O}$	
22.	Fresh milk has a pH of 6. How do you think the pH will change as it becomes sour? Explain. Why sour substances should not be kept in brass and copper vessels.	3
ANS	By the action of bacteria, the milk is transformed into curd which further increases the curds' acidity and lowers its pH from 6 to less than 6. The acid in the curd reacts with the metals causing corrosion and creation of toxic salts that cannot be digested.	
SECTION -D: CASE BASED QUESTIONS: (Q NO: 23- 24)		
23.	When electricity is passed through an aqueous solution of sodium chloride (called brine), it decomposes to form sodium hydroxide. The process is called the chlor-alkali process because of the products formed—chlor for chlorine and alkali for sodium hydroxide. <i>Based on the above given information, answer the following questions:</i> a) Write the chemical equation involved in this process b) What are the substance that are formed at anode and cathode on chlor-alkali process? c) What are the two uses of chlorine? Or Mention any two uses of Sodium hydroxide?	4
ANS	a) $2\text{NaCl}(\text{aq}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow 2 \text{NaOH}(\text{aq}) + \text{Cl}_2(\text{g}) + \text{H}_2(\text{g})$ b) At anode Chlorine gas & at cathode hydrogen gas are formed. c) Used for water treatment, Disinfectants, Pesticides etc Or Used in making soaps and detergents artificial fibres paper making .	
24.	The acids are sour in taste and change the colour of blue litmus to red, whereas, bases are bitter and change the colour of the red litmus to blue. Litmus is a natural indicator, turmeric is another such indicator. A stain of curry on a white cloth becomes reddish brown when soaked, which is basic in nature and is scrubbed. It turns yellow again when the cloth is washed with plenty of water. i. Give one example each of synthetic indicator and natural indicator. ii. What do acids do to red litmus paper? iii. What are olfactory indicators? Give two examples.	4
ANS	i. Synthetic indicator – methyl orange/ phenolphthalein Natural indicator – China rose ii. Acids do not have any effect on it.	

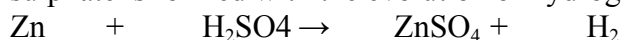
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	iii. Olfactory indicators are substances whose smell varies depending on whether it is mixed with an acidic or basic solution. Eg- Clove, Onion, Vanilla extract.	
	SECTION – E: LONG ANSWER QUESTIONS:(Q NO: 25)	
25.	(i) Identify the acid and the base whose combination forms the common salt that you use in your food. (ii) Write its chemical formula and chemical name of this salt. (iii) Name the source from which it is obtained. (iv) What is brine? What happens when electricity is passed through it?	5
	(i) Acid – HCl, Base – NaOH (ii) Chemical formula – NaCl , Chemical name – Sodium chloride (iii) (iv) Brine is a high concentration solution of sodium chloride in water. It forms Sodium hydroxide (NaOH), Hydrogen gas and chlorine gas.	
	Important Video link	
	http://amrita.olabs.edu.in/?sub=73&brch=3&sim=6&cnt=204	
	Short cut Tips/ concept map	
	<p>ACIDS BASES AND SALTS</p> <p>Elements combine to form numerous compounds. On the basis of their chemical properties, compounds can be classified into three categories:</p> <ul style="list-style-type: none"> • Acids • Bases • Salts <p>Acids and Bases in the Laboratory</p> <p>Indicators</p> <p>An indicator tells us whether a substance is acidic or basic in nature, by the change in colour.</p> <p>Common Indicators</p> <ul style="list-style-type: none"> • An acid turns blue litmus red and a base turns red litmus blue. • Methyl orange indicator gives a red colour in an acidic solution and gives a yellow colour in a basic solution. • Phenolphthalein is colourless in an acidic solution and gives a pink colour in a basic solution. <p>Olfactory Indicators</p> <ul style="list-style-type: none"> • Those substances whose odour changes in acidic or basic media are called olfactory indicators. For example: onion, vanilla and clove oil. • On adding sodium hydroxide solution to a cloth strip treated with onion, the smell of the onion is not detected. An acidic solution does not eliminate the smell of the onion. <p><u>Reaction of Acids & Bases with Metals</u></p> <p>Acids react with metals to produce salt by displacing hydrogen.</p>	

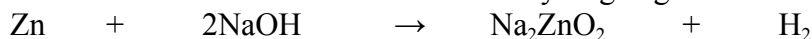
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For Example:

i. When dilute sulphuric acid reacts with the metal zinc, zinc sulphate is formed with the evolution of hydrogen gas.



ii. Zinc is the only metal which reacts with sodium hydroxide to form sodium zincate with the release of hydrogen gas.

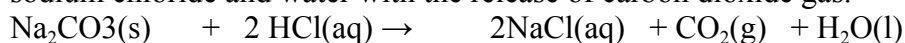


Reaction of Metal Carbonates & Bicarbonates with Acids

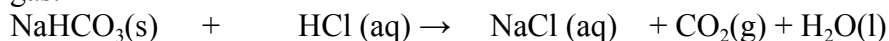
Acids react with metal carbonates or bicarbonates to form salt and water with the evolution of carbon dioxide gas.

For Example:

i. Hydrochloric acid reacts with sodium carbonate to form sodium chloride and water with the release of carbon dioxide gas.



ii. Similarly, sodium bicarbonate also reacts with hydrochloric acid to form sodium chloride and water with the release of carbon dioxide gas.



Neutralisation

The reaction between an acid and a base to form salt and water is called a neutralisation reaction.

For example:

Hydrochloric acid reacts with sodium hydroxide to form sodium chloride and water. $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$

Reaction of Metallic Oxides with Acids

Acids react with metallic oxides to form salt and water.

For Example:

Copper oxide (II), a black metal oxide reacts with dilute hydrochloric acid to form a blue-green coloured copper chloride (II) solution.



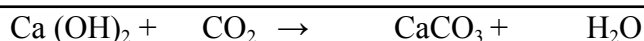
Reaction of Non-Metallic Oxides with Base

Bases react with non-metallic oxides to form salt and water.

For Example:

Calcium hydroxide reacts with non-metallic oxides like carbon dioxide to form calcium carbonate salt and water.

CHAPTER 2
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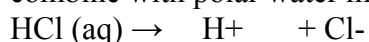
Acids and Bases in Water

Acids

An acid is a substance which dissociates (or ionises) when dissolved in water to release hydrogen ions.

For Example:

An aqueous solution of hydrochloric acid dissociates to form hydrogen ions. Since hydrogen ions do not exist as H^+ in solution, they combine with polar water molecules to form hydronium ions $[\text{H}_3\text{O}^+]$.



The presence of hydrogen ions $[\text{H}^+]$ in hydrochloric acid solution makes it behave like an acid.

Bases

A base is a substance which dissolves in water to produce hydroxide ions $[\text{OH}^-]$ ions. Bases which are soluble in water are called alkalis.

For Example:

Sodium hydroxide dissolves in water to produce hydroxide and sodium ions. $\text{NaOH (aq)} \rightarrow \text{Na}^+ + \text{OH}^-$

The presence of hydroxide ions $[\text{OH}^-]$ in sodium hydroxide solution makes it behave like a base.

pH Scale

- The strength of an acid or base is measured on a scale of numbers called the pH scale

pH = 7 - Neutral $[\text{H}^+] = [\text{OH}^-]$

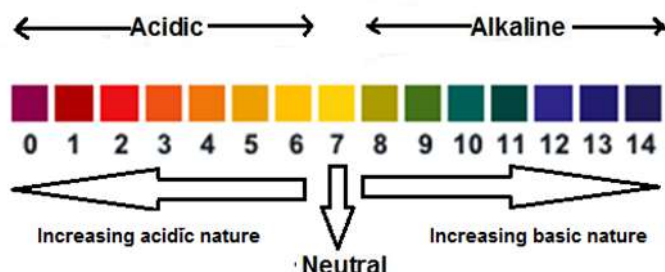
pH less than 7 -

Acidic $[\text{H}^+]$ more than $[\text{OH}^-]$

pH more than 7 -

Basic $[\text{OH}^-]$ more than $[\text{H}^+]$

- It shows the relative strength of acids and alkalis.
- The normal pH scale ranges from 0 to 14 as given below.



Universal Indicator

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In case of a colourless liquid, the accurate pH can be obtained by adding a universal indicator.

It is a mixture of several indicators and shows different colours at different concentration of hydrogen ions in a solution.

For Example:

- i. A universal indicator produces green colour in a neutral solution, pH = 7.
- ii. The colour changes from blue to violet as pH increases from 7 to 14.
- iii. The colour changes from yellow to pink and then to red as pH decreases from 7 to 1.

Importance of pH in everyday life

pH change and survival of animals

- Our body works well within a narrow pH range of 7.0 to 7.8.
- When the pH of rain water is less than 5.6, it is known as acid rain.
- When this acid rain flows into rivers, it lowers the pH of the river water making the survival of aquatic life difficult.

pH in our digestive system

- Our stomach produces hydrochloric acid which helps in the digestion of food without harming the stomach.
- Sometimes excess acid is produced in the stomach which causes indigestion.
- To get rid of this pain, bases called antacids are used.
- Antacids are a group of mild bases which react with the excess acid and neutralise it.
- Commonly used antacids are magnesium hydroxide $[Mg(OH)_2]$ & sodium bicarbonate $[NaHCO_3]$

pH change - Cause of tooth decay

- Tooth decay starts when the pH in the mouth falls below 5.5.
- Tooth enamel is made up of calcium phosphate which is the hardest substance in the body.
- It is insoluble in water but gets corroded when the pH in the mouth falls below 5.5.
- The bacteria present in the mouth produce acids due to the degradation of sugar and food particles after eating.
- Hence, to prevent tooth decay, the mouth should be rinsed after eating food and toothpastes which are basic should be used cleaning teeth to neutralise the excess acid.

More about Salts

Salts having same positive ions (or same negative ions) are said to belong to a family of salts.

pH of Salts

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- Salts of strong acid and a strong base are neutral, with a pH value of 7.

For Example: NaCl, Na₂SO₄

- Salts of strong acid and weak base are acidic, with a pH value less than 7.

For Example: Ammonium chloride solution has pH value of 6.

- Salts of weak acid and strong base are basic, with a pH value more than 7.

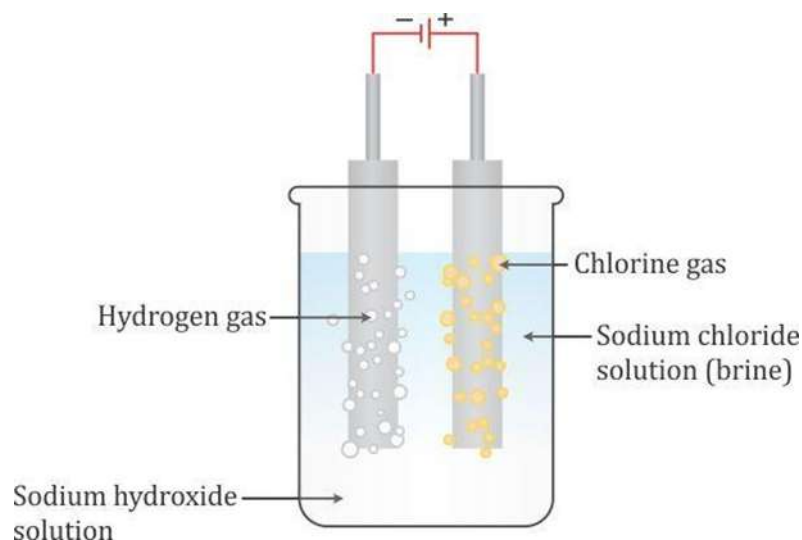
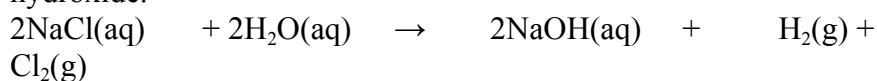
For Example: Sodium carbonate solution has a pH value of 9.

Common Salt

- Chemical name: Sodium chloride
- Common salt is a neutral salt and can be prepared in the laboratory by the reaction of sodium hydroxide and hydrochloric acid.
$$\text{NaOH(aq)} + \text{HCl(aq)} \rightarrow \text{NaCl(aq)} + \text{H}_2\text{O(aq)}$$
- It is an important raw material for products of daily use such as NaOH, baking soda, washing soda and bleaching powder.

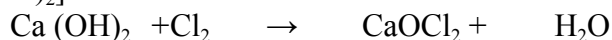
Sodium Hydroxide

- Sodium hydroxide is produced by the electrolysis of an aqueous solution of sodium chloride (called brine).
- The process is called the chlor-alkali process because of the products formed, i.e. 'chlor' for chlorine and 'alkali' for sodium hydroxide.



Bleaching Powder

- Bleaching powder is manufactured from chlorine gas.
- It is produced by the action of chlorine on dry slaked lime [Ca(OH)₂].



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- It is represented as CaOCl_2

Uses

- For bleaching cotton and linen in the textile industry and for bleaching wood pulp in the paper industry.
- Used for disinfecting drinking water to make it free of germs.

Baking Soda

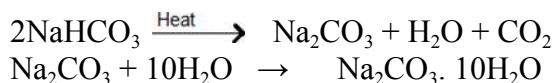
- Chemical formula: NaHCO_3
- It is produced on a large scale by treating cold and concentrated solution of sodium chloride (brine) with ammonia and carbon dioxide.
$$\text{NaCl} + \text{H}_2\text{O} + \text{CO}_2 + \text{NH}_3 \rightarrow \text{NH}_4\text{Cl} + \text{NaHCO}_3$$
- On heating, it decomposes to give sodium carbonate with the evolution of carbon dioxide. $2\text{NaHCO}_3 \xrightarrow{\text{Heat}} \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$

Uses

- Used as an antacid to treat acidity of the stomach.
- Used to make baking powder, which is used in preparation of cakes, breads, etc.
- Used in soda-acid fire extinguishers.

Washing Soda

- Chemical formula: $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$
- Sodium hydrogen carbonate, on heating decomposes to give sodium carbonate with the release of hydrogen gas. Re-crystallisation of sodium carbonate produces washing soda.



Uses

- Used in glass, soap and paper industries.
- Employed in the manufacture of sodium compounds such as borax.

Water Of Crystallisation

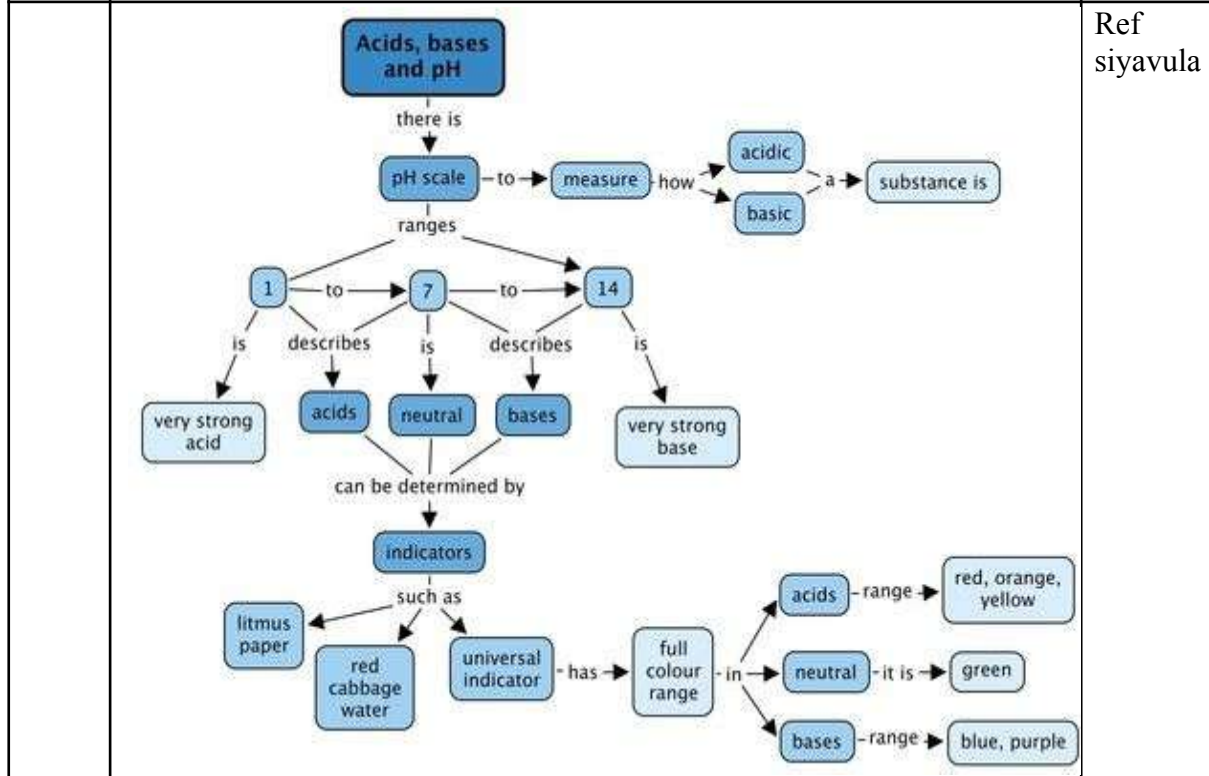
- Water molecules which form a part of the structure of a crystal are called water of crystallisation.
- The salts which contain water of crystallisation are called hydrated salts.
- Every hydrated salt has a fixed number of molecules of crystallisation in its one formula unit.
For Example: $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$, $\text{CaSO}_4 \cdot 5\text{H}_2\text{O}$, and $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$

- Copper sulphate crystals ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$) are blue in colour, and on heating strongly they lose all the water of crystallisation and form anhydrous copper sulphate, which is white. On adding water to anhydrous copper sulphate, it gets hydrated and turns blue.

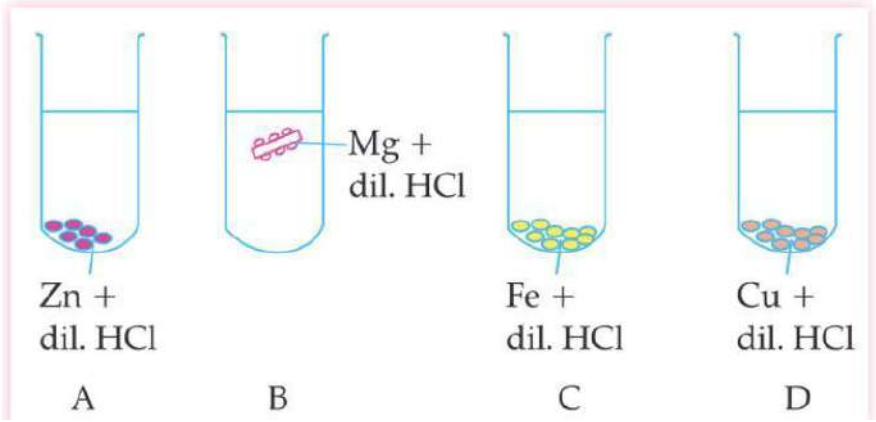
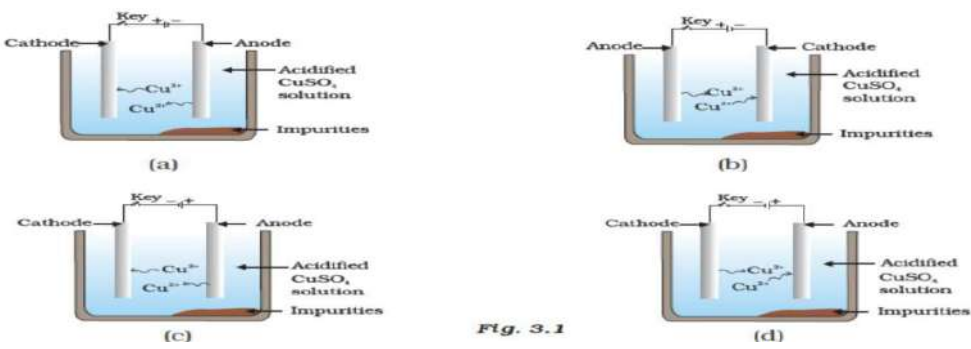
CHAPTER 2
ACIDS, BASES AND SALTS

	<p> $\text{CuSO}_4 \cdot 5\text{H}_2\text{O} \xrightarrow{\text{Heat}} \text{CuSO}_4 + 5\text{H}_2\text{O}$ $\text{CuSO}_4 + 5\text{H}_2\text{O} \rightarrow \text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ </p> <p>Plaster of Paris</p> <p>Plaster of Paris is prepared by heating gypsum at 373 K. On heating, it loses water molecules and becomes calcium sulphate hemihydrate ($\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$) which is called Plaster of Paris.</p> <p> $\text{CaSO}_4 \cdot 2\text{H}_2\text{O} \xrightarrow{\text{Heat}} \text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O} + 1 \frac{1}{2} \text{H}_2\text{O}$ </p> <p>Gypsum Plaster of Paris</p> <p>Uses</p> <ul style="list-style-type: none"> • Used in hospitals as plaster for supporting fractured bones in the right position. • Used as a fire-proofing material. 	
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CONCEPT MAP



CHAPTER – 3
METALS AND NON-METALS

Q NO.	SECTION A (MULTIPLE CHOICE QUESTIONS)	MARKS
1.	<p>Ionic compound have high melting point due to</p> <p>(a) Strong force of attraction between oppositely charged ions. (b) Less force of attraction between oppositely charged ions. (c) Strong force of attraction between similar charged ions. (d) None of these</p>	1
ANS	Option(a)	
2.	<p>The diagram shows the reaction between metal and dilute acid.</p>  <p>What is the reason for different behavior of Mg in test tube B?</p> <p>a) Mg is a lighter element than dil. HCl. b) Mg reacts with dil. HCl to produce H₂ gas which helps in floating. c) Mg reacts with dil. HCl to produce N₂ gas which helps in floating. d) Mg reacts with dil. HCl to produce CO₂ gas which helps in floating.</p>	1
ANS	b) Mg reacts with dil. HCl to produce H ₂ gas which helps in floating.	
3.	<p>In the thermite process, the reducing agent is -</p> <p>a) Nickel b) Zinc c) Sodium d) Aluminium</p>	1
ANS	(d) Aluminium	
4.	<p>Which one of the following figures correctly describes the process of electrolytic refining?</p>  <p>Fig. 3.1</p>	1
ANS	b)	

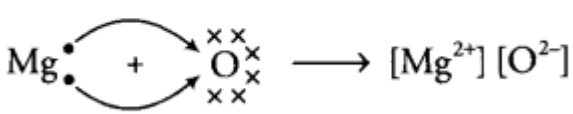
CHAPTER – 3
METALS AND NON-METALS

	Explanation: Copper ions are dispersed from positively charged anode and deposited on negatively charged cathode.																										
5.	An element A is soft and can be cut with a knife. This is very reactive to air and cannot be kept open in air. It reacts vigorously with water. Identify the element from the following a) Mg b) Na c) P d) Ca	1																									
ANS	b) Na																										
6.	Which of the following non-metals is a liquid? a) Carbon b) Bromine c) Phosphorus d) Sulphur	1																									
	Option (b)																										
7.	The compound obtained on reaction of iron with steam is/are - Fe ₂ O ₃ Fe ₃ O ₄ FeO Fe ₂ O ₃ and Fe ₃ O ₄	1																									
ANS	b) Fe ₃ O ₄																										
8.	An iron nail was suspended in solution and kept for a while the solution is - a) Remained blue and coating was found on the nail. b) turned green and a coating was formed on the nail c) remained blue and no coating was formed on the nail d) turned green and no coating was formed on the nail	1																									
ANS	b) turned green and a coating was formed on the nail.																										
9.	A cable manufacturing unit tested few elements on the basis of their physical properties. <table border="1" data-bbox="336 1370 1166 1724"> <thead> <tr> <th>Properties</th> <th>W</th> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>Malleable</td> <td>Yes</td> <td>No</td> <td>No</td> <td>No</td> </tr> <tr> <td>Ductile</td> <td>Yes</td> <td>No</td> <td>No</td> <td>Yes</td> </tr> <tr> <td>Electrical conductivity</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>No</td> </tr> <tr> <td>Melting Point</td> <td>High</td> <td>Low</td> <td>Low</td> <td>High</td> </tr> </tbody> </table> Which of the above elements were discarded for usage by the company? a) W, X, Y b) X, Y, Z	Properties	W	X	Y	Z	Malleable	Yes	No	No	No	Ductile	Yes	No	No	Yes	Electrical conductivity	Yes	Yes	Yes	No	Melting Point	High	Low	Low	High	1
Properties	W	X	Y	Z																							
Malleable	Yes	No	No	No																							
Ductile	Yes	No	No	Yes																							
Electrical conductivity	Yes	Yes	Yes	No																							
Melting Point	High	Low	Low	High																							

CHAPTER – 3
METALS AND NON-METALS

	c) W, X, Z d) W, Y, Z					
ANS	b) X, Y, Z A cable manufacturing company makes cables, thus it needs elements which are malleable, ductile, conduct electricity and have high melting point. X and Y are discarded as they are not malleable and Z is discarded because it does not conduct electricity.					
10.	Na ⁺ has – a) 11 protons, 10 electrons b) 10 protons, 11 electrons c) 12 protons, 11 electrons d) 11 protons, 12 electrons	1				
ANS	a) 11 protons, 10 electrons					
ASSERTION REASONING QUESTIONS: (QN NO 11-12)						
	Assertion: (A). Reason: (R) CHOOSE THE CORRECT OPTION AS PER THE STATEMENTS GIVEN IN ASSERTION AND REASON: a) Assertion and Reason both are correct and R is the correct explanation of A. b) Assertion and Reason both are correct but R is not the correct explanation of A. c) Assertion is true but Reason is false. d) Assertion and Reason both are incorrect.					
11.	Assertion - Zinc carbonate is heated strongly in presence of air to form zinc oxide and carbon dioxide. Reason - Calcination is the process in which a carbonate ore is heated strongly in the absence of air to convert into metal oxide.	1				
	d) Assertion is false but Reason is true.					
12.	Assertion : Some metal oxides are amphoteric in nature. Reason : Metallic oxides show acidic behaviour.	1				
	c) Assertion is true but Reason is false.					
SECTION -B: PICTORIAL, KNOWLEDGE AND UNDERSTANDING (QN NO 13-17)						
13.	Define activity series of metals .Arrange the metals gold, copper, iron and magnesium in order of their increase in reactivity.	2				
ANS	The series of metals in which metals are arranged in decreasing order of their reactivity. Au<Cu<Fe<Mg is increasing order of reactivity.					
14.	Write two differences between calcinations and roasting.	2				
ANS	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Calcination</th> <th style="width: 50%; text-align: center;">Roasting</th> </tr> </thead> <tbody> <tr> <td>(i) It is carried out by heating ore</td> <td>(i) It is carried out by</td> </tr> </tbody> </table>	Calcination	Roasting	(i) It is carried out by heating ore	(i) It is carried out by	
Calcination	Roasting					
(i) It is carried out by heating ore	(i) It is carried out by					

CHAPTER – 3
METALS AND NON-METALS

	in the absence of air. heating the presence of air. (ii)It converts carbonate ores into oxides (ii)It converts sulphide.	
15.	Give reason for the following: (a) Aluminium oxide is considered as an amphoteric oxide. (b) Ionic compounds conduct electricity in molten state.	2
ANS	(a) It is because it reacts with acids as well as bases to produce salts and water. 'Al' is less electropositive metal. So, it forms amphoteric oxide which can react with acid as well as base. (b) Ionic compounds can conduct electricity in molten state because ions ' become free to move in molten state.	
16	Using the electronic configurations, explain how magnesium atom combines with oxygen atom to form magnesium oxide by transfer of electrons.	2
ANS	$\begin{array}{c} \text{Mg} \longrightarrow \text{Mg}^{2+} + 2e^{-} \\ [2, 8, 2] \quad [2, 8] \\ \text{O} + 2e^{-} \longrightarrow \text{O}^{2-} \\ [2, 6] \quad [2, 8] \end{array}$  $\text{Mg}^{2+} + \text{O}^{2-} \longrightarrow \text{MgO}$	
17.	Silver articles become black when kept in open for some time, whereas copper vessels lose their shiny brown surfaces and gain a green coat when kept in open. Name the substances present in air with which these metals react and write the name of the products formed.	2
ANS	Sliver articles turn black when exposed in atmosphere because sliver reacts with hydrogen sulphide present in air and form black layer of sliver sulphide. $2\text{Ag}(s) + \text{H}_2\text{S}(g) \rightarrow \text{Ag}_2\text{S}(s) + \text{H}_2(g)$ (Black) Copper reacts with moisture in the air and turns green in colour. $2\text{Cu} + \text{CO}_2 + \text{O}_2 + \text{H}_2\text{O} \rightarrow \text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$	
	SECTION -C : APPLICATION,EVALUATE,KNOWLEDGE AND ANALYSIS:(Q NO: 18-22)	
18	A metal 'X' acquires a green colour coating on its surface on exposure to air. (i) Identify the metal 'X' and name the process responsible for this change. (ii)Name and write chemical formula of the green coating formed on the metal. (iii) List two important methods to prevent the process.	3
Ans	(i)Metal is copper. The process is corrosion. (ii)Basic copper carbonate $[\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2]$. (iii) • It should be coated with tin • It should be mixed with other metals to form alloys	

CHAPTER – 3
METALS AND NON-METALS

19	An ore on heating in air produces sulphur dioxide. Which process would you suggest for its concentration? Describe briefly any two steps involved in the conversion of this concentrated ore into related metal.	3
Ans	It is concentrated by froth-floatation process. (i)Roasting: The concentrated sulphide ore is heated strongly in the presence of oxygen to convert it into its oxide. (ii)Reduction : This oxide of metal is reduced with suitable reducing agent to get free metal.	
20	A metal 'X' when added to a solution containing $ZnSO_4$, shows no change in the colour of the solution. The metal 'X' is also used to join railway tracks. (i) Identify the metal 'X'. (ii) What is the other reactant used in the reaction with 'X' to join railway tracks? (iii) Name the method to extract the metal 'X'.	3
Ans	(i) 'X' is aluminium. (ii) Fe_2O_3 (ii) Electrolytic reduction.	
21	'M' is an element which is out of Cu, Fe, Al, Na. It shows the following properties: (i) One of its ore is rich in M_2O_3 . (ii) M_2O_3 is not affected by water. (iii) It corrodes easily. (iv) It forms two chlorides MCl_2 , and MCl_3 . Identify 'M'.	3
Ans	As the metal 'M' forms oxide M_2O_3 , it is trivalent. Out of the metals listed, only Fe and Al are trivalent. M_2O_3 is not affected by water, so 'M' can be out of Fe or Al. Fe and Al both corrode easily. Out of Al and Fe, only Fe can form divalent chloride, so the element 'M' is Fe.	
22	An ore on treatment with dilute hydrochloric acid produces brisk effervescence. Name the type of ore with one example. What steps will be required to obtain metal from the enriched ore? Also write the chemical equations for the reactions involved in the process.	3
Ans	Carbonate ore Zinc carbonate Calcination $ZnCO_3 \rightarrow ZnO + CO_2$ • Reduction: $ZnO + C \rightarrow Zn + CO$	
SECTION -D: CASE BASED QUESTIONS: (Q NO: 23- 24)		
23.	Metals react with non-metals by losing or gaining electrons. They have a give-and-take relation between them. Ionic compounds are usually solid and hard in nature. They are generally soluble in water and insoluble in solvent like petrol, kerosene, etc. The melting and boiling points of electrovalent compounds are high. In order to change the physical state of the electrovalent compounds (from solid to liquid to gas), a high temperature is needed to overcome the attractive forces. i) Which of the following properties is not generally exhibited ionic compounds? (a) Electrical conductivity in molten state (b) Electrical conductivity in solid state (c) High melting and boiling points (d) Solubility in water ii) Ionic compounds are usually solid and hard in nature. This is due to	4

CHAPTER – 3
METALS AND NON-METALS

	<p>(a) Strong forces of attraction between the oppositely charged ions. (b) Weak forces of attraction between the oppositely charged ions. (c) Strong forces of attraction between the same charged ions. (d) Weak forces of attraction between the similarly charged ions. iii) Transfer of one or more valence electrons from a metal to nonmetal takes place in case of (a) Chemical bonding (b) molecular bonding (c) ionic bonding (d) covalent bonding iv) The atomic number of four elements A, B, C, D is 6, 8, 10 and 12 respectively. The two elements which can react to form ionic compounds are: (a) A and B (b) C and D (c) B and D (d) A and C</p>	
Ans	<p>(i) (b) Electrical conductivity in solid state (ii) (a) Strong forces of attraction between the oppositely charged ions. (iii) (c) ionic bonding (iv) (c) B and D</p>	
24.	<p>Alloying is a very good method of improving the properties of a metal. This gives the desired properties of the metal. For example, iron is the most widely used metal. But it is never used in its pure state. This is because pure iron is very soft and stretches easily when hot. But, if it is mixed with a small amount of carbon (about 0.05%), it becomes hard and strong. When iron is mixed with nickel and chromium, we get stainless steel, which is hard and does not rust. Thus, if iron is mixed with some other substance, its properties change. In fact, the properties of any metal can be changed, if it is mixed with some other substance. The substance added may be a metal or a non-metal i) Which among the following alloys contain non-metal as one of its constituents? (a) Brass (b) Bronze (c) Amalgam (d) Steel ii) An alloy can be one of the following types: (a) Homogenous (b) Heterogeneous (c) Intermetallic (d) All of the above iii) By adding silicon to stainless steel which of the following property is enhanced? (a) Resistance to corrosion (b) Electrical characteristics (c) Ductility (d) Magnetic property iv) Which of the following alloy(s) contain mercury as one of its constituents? (a) Zinc amalgam (b) Alnico (c) Solder (d) Bronze</p>	4
Ans	<p>(i) (d) Steel (ii) (a) Homogenous (iii) (b) Electrical characteristics (iv) (a) Zinc amalgam</p>	
SECTION – E: LONG ANSWER QUESTIONS:(Q NO: 25)		
25.	<p>Explain what happens when (i) Mercuric oxide is heated. (ii) Mixture of cuprous oxide and cuprous sulphide is heated. (iii) Aluminium is reacted with manganese dioxide. (iv) Ferric oxide is reduced with aluminium. (v) Zinc carbonate undergoes calcination.</p>	5
ANS	<p>(i) On heating, mercuric oxide decomposes to give mercury .and oxygen. $2\text{HgO}_{(s)} \xrightarrow{\text{Heat}} 2\text{Hg}_{(l)} + \text{O}_{2(g)}$</p>	

CHAPTER – 3
METALS AND NON-METALS

	<p>(ii) On heating mixture of cuprous oxide and cuprous sulphide, copper and sulphur dioxide are produced.</p> <p>(ii) On heating mixture of cuprous oxide and cuprous sulphide, copper and sulphur dioxide are produced.</p> $2\text{Cu}_2\text{O}_{(s)} + \text{Cu}_2\text{S}_{(s)} \xrightarrow{\text{Heat}} 6\text{Cu}_{(s)} + \text{SO}_{2(g)}$ <p>(iii) When aluminium is heated with manganese dioxide, manganese and aluminium oxide are formed.</p> $3\text{MnO}_{2(s)} + 4\text{Al}_{(s)} \xrightarrow{\text{Heat}} 3\text{Mn}_{(l)} + 2\text{Al}_2\text{O}_{3(s)}$ <p>(iv) Ferric oxide reacts with aluminium to produce aluminium oxide and iron.</p> $\text{Fe}_2\text{O}_{3(s)} + 2\text{Al}_{(s)} \xrightarrow{\text{Heat}} 2\text{Fe}_{(l)} + \text{Al}_2\text{O}_{3(s)}$ <p>(v) On calcination, zinc carbonate produces zinc oxide and carbon dioxide.</p> $\text{ZnCO}_{3(s)} \xrightarrow{\text{Calcination}} \text{ZnO}_{(s)} + \text{CO}_{2(g)}$			
	<p>Important Video link</p>			
	<p>https://youtube.com/shorts/bej9ECbaKuw?si=dJ8WuVpiKF9DuEP1</p>			
	<p>https://youtu.be/-phiR_5JD4E?si=zef2GatWCh4IzQV4</p>			
	<p>https://youtu.be/C3FIdTkbqcA?si=MiCPQHjP6KfjEOwx</p>			
	<p>Short cut Tips/ concept map</p>			
	<table border="1"> <tr> <td data-bbox="296 1050 360 2045">2</td> <td data-bbox="360 1050 1417 2045"> <p>METALS AND NON- METALS</p> <ul style="list-style-type: none"> • Elements are divided into Metals, non –Metals and Metalloids. Metalloids possess the characters of both metals and nonmetals. • Metals - Iron, Zinc, Copper, Aluminium etc. • Non – metals: Chlorine, Nitrogen, Hydrogen, Oxygen, Sulphur etc. • Metalloids - Silicon, Arsenic, Germanium <p>Physical properties of Metals and Non-Metals</p> <p>Difference between Metal and Non-Metal</p> </td> </tr> </table>	2	<p>METALS AND NON- METALS</p> <ul style="list-style-type: none"> • Elements are divided into Metals, non –Metals and Metalloids. Metalloids possess the characters of both metals and nonmetals. • Metals - Iron, Zinc, Copper, Aluminium etc. • Non – metals: Chlorine, Nitrogen, Hydrogen, Oxygen, Sulphur etc. • Metalloids - Silicon, Arsenic, Germanium <p>Physical properties of Metals and Non-Metals</p> <p>Difference between Metal and Non-Metal</p>	
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II. CHEMICAL PROPERTIES OF METALS

(A) Reaction with Air :

Metals combine with oxygen to form metal oxide.



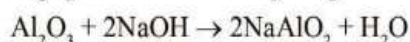
Examples :

- (i) $2\text{Cu} + \text{O}_2 \rightarrow 2\text{CuO}$
Copper oxide (black)
- (ii) $4\text{Al} + 3\text{O}_2 \rightarrow 2\text{Al}_2\text{O}_3$
Aluminium oxide
- (iii) $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$

Different metals show different reactivities towards O_2 .

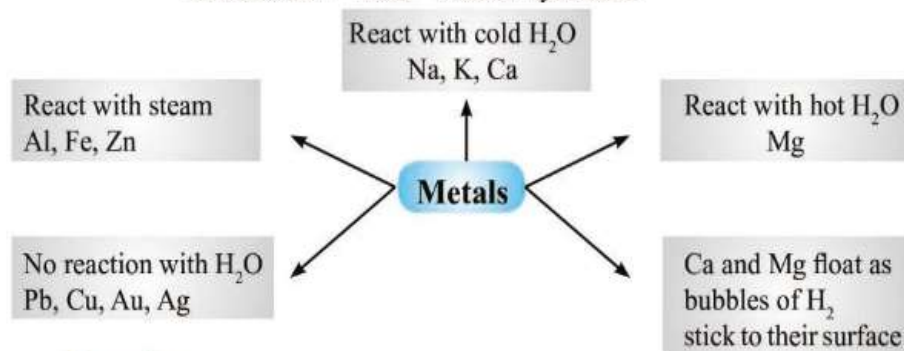
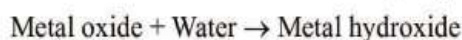
- Na and K react so vigorously that they catch fire if kept in open so they are kept immersed in kerosene.
- Surfaces of Mg, Al, Zn, Pb are covered with a thin layer of oxide which prevent them from further oxidation.
- Fe does not burn on heating but iron fillings burn vigorously.
- Cu does not burn but is coated with black copper oxide.
- Au and Ag does not react with oxygen.

Amphoteric Oxides: Metal oxides which react with both acids as well as bases to produce salts and water are called amphoteric oxides.



Sodium Aluminate

(B) Reaction of Metals with Water :



Examples :

- (i) $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2 + \text{Heat}$
- (ii) $\text{Ca} + 2\text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2 + \text{H}_2$
- (iii) $\text{Mg} + 2\text{H}_2\text{O} \rightarrow \text{Mg(OH)}_2 + \text{H}_2$
- (iv) $2\text{Al} + 3\text{H}_2\text{O} \rightarrow \text{Al}_2\text{O}_3 + 3\text{H}_2$

CHAPTER – 3
METALS AND NON-METALS

(D) Reaction of Metals with Solutions of other Metal Salts :



- Reactive metals can displace less reactive metals from their compounds in solution form.

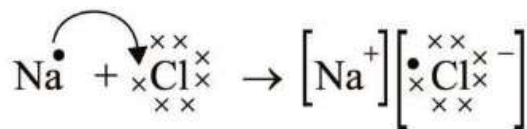


REACTIVITY SERIES

The reactivity series is a list of metals arranged in the order of their decreasing activities.

K		Most reactive
Na		
Ca		
Mg		
Al		
Zn		Reactivity decreases
Fe		
Pb		
H		
Cu		
Hg		
Ag		
Au		Least reactive

3



Ionic Compounds

The compounds formed by the transfer of electrons from a metal to a non-metal are called ionic compounds or electrovalent compounds.

Properties of Ionic Compounds

- Physical nature :** They are solid and hard, generally brittle.
- Melting and Boiling Point :** They have high melting and boiling point.
- Solubility :** Generally soluble in water and insoluble in solvents such as kerosene, petrol etc.
- Conduction of electricity :** Ionic compounds conduct electricity in molten and solution form but not in solid state.

CHAPTER – 3 METALS AND NON-METALS

The surface of some metals such as iron is corroded when they are exposed to moist air for a long period of time. This is called corrosion.

- (i) Silver becomes black when exposed to air as it reacts with air to form a coating of silver sulphide.
- (ii) Copper reacts with moist carbon dioxide in the air and gains a green coat of copper carbonate.
- (iii) Iron when exposed to moist air acquires a coating of a brown flaky substance called rust.

Prevention of Corrosion

The rusting of iron can be prevented by painting, oiling, greasing, galvanizing, chrome plating, anodizing or making alloys.

Galvanization : It is a method of protecting steel and iron from rusting by coating them with a thin layer of zinc.

Alloy : An alloy is a homogenous mixture of two or more metals or a metal and a non-metal.

Iron : Mixed with small amount of carbon becomes hard and strong.

Steel : Iron + Nickel and chromium

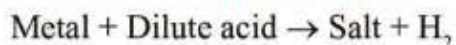
Brass : Copper + Zinc

Bronze : Copper + Tin (Sn)

Solder : Lead + tin

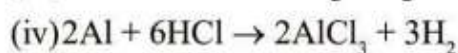
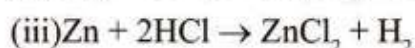
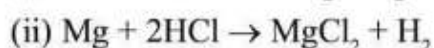
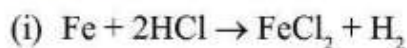
Amalgam : If one of the metal is mercury (Hg).

(C) Reaction of Metals with Acids (Dilute) :



Cu, Ag, Hg do not react with dil. acids.

Examples :



CHAPTER – 3
METALS AND NON-METALS

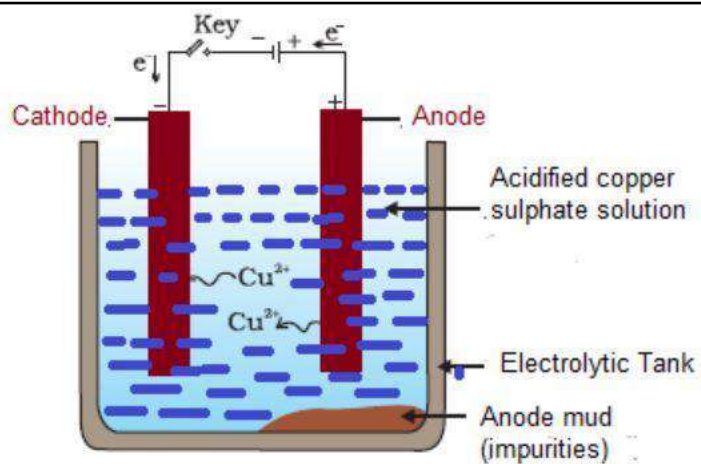
CONCEPT MAP

Every word of the following line will help to remember the activity series of metal.

Please Stop Calling Me A Zebra, I Truly Like Her Calling Me Super Powerful Giraffe.

Word	Name of element	Symbol
Please	Potassium	P
Stop	Sodium	Na
Calling	Calcium	Ca
Me	Magnesium	Mg
A	Aluminium	Al
Zebra	Zinc	Zn
I	Iron	Fe
Truly	Tin	Sn
Like	Lead	Pb
Her	Hydrogen	H
Calling	Copper	Cu
Me	Mercury	Hg
Super	Silver	Ag
Powerful	Platinam	Pt
Giraffe	Gold	Au

CHAPTER – 3
METALS AND NON-METALS



Refining of Copper metal. Anode act as impure Cu and Cathode act as pure coper.

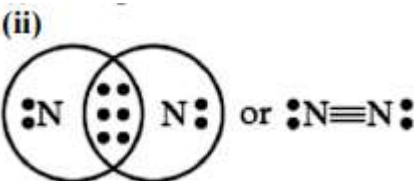
CHAPTER 4
CARBON AND ITS COMPOUNDS

S NO.	SECTION A (MULTIPLE CHOICE QUESTIONS) (QN NO 1-10)	MARKS
1.	The property by which large number of atoms of the same element get linked through covalent bonds forming long chains is called i) Allotropy ii) Catenation iii) Addition reaction iv) Polymerisation	1
ANS	ii) Catenation	
2.	Select a pair of homologues from the following i) C ₃ H ₆ & C ₄ H ₁₀ ii) CH ₃ COOH & C ₂ H ₅ COOH iii) C ₄ H ₈ & C ₃ H ₄ iv) CH ₃ CH ₃ CO & C ₂ H ₅ CHO	1
ANS	ii) CH ₃ COOH & C ₂ H ₅ COOH	
3.	Graphite is a good conductor of electricity while Diamond is not because- i) In graphite only 3 valence electrons are used for bond formation & the 4 th valence electron is free to move ii) In Diamond only 3 valence electrons are used for bond formation & the 4 th valence electron is free to move. iii) In Both Diamond & graphite there are Free electrons iv) In Graphite each carbon atom is attached to 4 other Carbon atoms.	1
ANS	i) In graphite only 3 valence electrons are used for bond formation & the 4 th valence electron is free to move.	
4.	In which of the following compounds, -OH is the functional group ? i) Butanone ii) Butanal iii) Butanol iv) Butanoic acid	1
ANS	iii) Butanol	
5.	Which of the following are correct structural isomers of butane? <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>(i)</p> $\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array}$ </div> <div style="text-align: center;"> <p>(iii)</p> $\begin{array}{ccc} \text{H} & \text{H} & \text{H} \\ & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ & & \\ \text{H} & & \text{C}-\text{H} \\ & & \\ & & \text{H} \end{array}$ </div> </div> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>(ii)</p> $\begin{array}{ccc} \text{H} & \text{H} & \text{H} \\ & & \\ \text{H}-\text{C} & - & \text{C} & - & \text{C}-\text{H} \\ & & & & \\ \text{H} & & \text{H}-\text{C}-\text{H} & & \text{H} \\ & & & & \\ & & \text{H} & & \end{array}$ </div> <div style="text-align: center;"> <p>(iv)</p> $\begin{array}{ccc} \text{H} & \text{H} & \\ & & \\ \text{H}-\text{C}-\text{C}-\text{H} \\ & & \\ \text{H}-\text{C}-\text{C}-\text{H} \\ & & \\ \text{H} & \text{H} & \end{array}$ </div> </div> <p>(a) (i) and (iii) (b) (ii) and (iv) (c) (i) and (ii) (d) (iii) and (iv)</p>	1
ANS	(a) (i) and (ii) Chemical formula of Butane is C ₄ H ₁₀ , here option iii) and iv) have 8 hydrogen atoms, hence they are wrong.	

CHAPTER 4
CARBON AND ITS COMPOUNDS

6.	Dilute alkaline KMnO_4 solution is - (a) an oxidising agent (b) a reducing agent (c) a bleaching agent (d) none of these	1
ANS	(a) an oxidising agent	
7.	The number of C-H bonds in ethane - (a) 4 (b) 6 (c) 8 (d) 10	1
ANS	(b) 6	
8.	Diamond is not a good conductor of electricity because - (a) It is very hard (b) Its structure is very compact (c) It is not soluble in water (d) It has no free electrons to conduct electric current.	1
ANS	(d) It has no free electrons to conduct electric current.	
9.	The first member of alkene homologous series is - (a) Ethyne (b) Ethene (c) Propyne (d) Methane	1
ANS	(b) Ethene	
10.	Which of the following compounds contains a double bond? (a) H_2O (b) CH_4 (c) NH_3 (d) O_2	1
ANS	d) O_2	
ASSERTION REASONING QUESTIONS: (QN NO 11-12)		
	Assertion: (A). Reason: (R) CHOOSE THE CORRECT OPTION AS PER THE STATEMENTS GIVEN IN ASSERTION AND REASON: a) Assertion and Reason both are correct and R is the correct explanation of A. b) Assertion and Reason both are correct but R is not the correct explanation of A. c) Assertion is true but Reason is false. d) Assertion and Reason both are incorrect.	
11.	Assertion- Cooking oil decolourises bromine water. Reason- Cooking oil is a saturated compound.	1
ANS	Assertion is true but Reason is false.	
12.	Assertion - Ethene & Ethyne are unsaturated hydrocarbons. Reason - Both contain C-C & C-H single bonds	1
ANS	c) Assertion is true but Reason is false.	

CHAPTER 4
CARBON AND ITS COMPOUNDS

	SECTION -B: PICTORIAL, KNOWLEDGE AND UNDERSTANDING (QN NO 13-17)	
13.	Write the name and molecular formula of an organic compound having its name suffixed with '-ol' and having two carbon atoms in the molecule. With the help of a balanced chemical equation indicate what happens when it is heated with excess of conc.H ₂ SO ₄ .	2
ANS	It is ethanol, its molecular formula is C ₂ H ₆ O. Ethanol forms ethene, when heated with conc. H ₂ SO ₄ . $\text{CH}_3\text{CH}_2\text{OH} \xrightarrow[\text{heat}]{\text{Conc. H}_2\text{SO}_4} \text{CH}_2=\text{CH}_2 + \text{H}_2\text{O}$ <p style="text-align: center;">Ethanol Ethene</p>	
14.	Atom of an element contains five electrons in its valence shell. This element is major component of air. It exists as a diatomic molecule. (i) Identify the element. (ii) Show the bond formed between two atoms of this element. (iii) Write the nature of the bond between the two atoms.	2
ANS	(i) Nitrogen. (ii)  (iii) Covalent bond.	
15.	(a) Why are covalent compounds generally poor conductors of electricity? (b) Name the following compound: $\begin{array}{c} \text{H} & & \text{H} \\ & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ & & \\ \text{H} & \text{O} & \text{H} \end{array}$ Name the gas evolved when ethanoic acid is added to sodium carbonate. How would you prove the presence of this gas?	2
ANS	(a) It is because they do not form ions. (b) Propanone (c) Carbon dioxide gas. It turns lime water milky. $2\text{CH}_3\text{COOH}(l) + \text{Na}_2\text{CO}_3(aq) \longrightarrow 2\text{CH}_3\text{COONa}(aq) + \text{H}_2\text{O}(l) + \text{CO}_2(g)$ $\text{Ca}(\text{OH})_2(aq) + \text{CO}_2(g) \longrightarrow \text{CaCO}_3(s) + \text{H}_2\text{O}(l)$ <p style="text-align: center;">Calcium Carbon Calcium hydroxide dioxide carbonate</p>	
16.	Explain why carbon generally forms compounds by covalent bonds.	2
ANS	Carbon cannot lose four electrons easily because very high energy is required. It cannot gain four electrons easily because six protons cannot hold 10 electrons. It can easily share four electrons forming covalent bonds.	

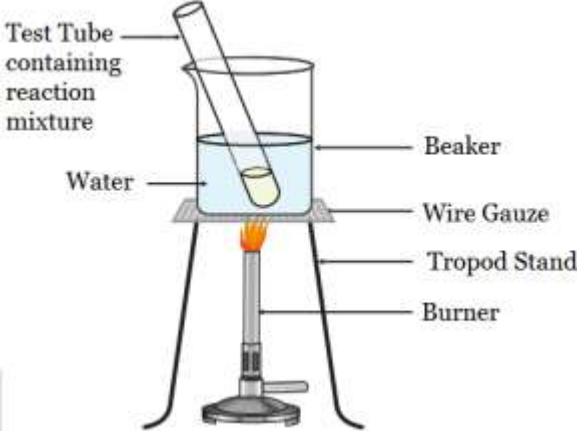
CHAPTER 4
CARBON AND ITS COMPOUNDS

17.	What is a homologous series? Which two of the following organic compounds belong to the same homologous? CH_3 , C_2H_6 , $\text{C}_2\text{H}_6\text{O}$, $\text{C}_2\text{H}_6\text{O}_2$, CH_4O	2
ANS	SECTION -C : APPLICATION, EVALUATE, KNOWLEDGE AND ANALYSIS: (Q NO: 18-22)	
18.	a) What are isomers? Draw the structures of two isomers of butane, C_4H_{10} . b) Why can't we have isomers of first three members of alkane series?	3
ANS	Those compounds, which have same molecular formula but different structural formulae are called isomers. $\begin{array}{ccc} \text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_3 & \text{CH}_3-\text{CH}-\text{CH}_3 & \\ & & \\ & \text{CH}_3 & \\ \textit{n-Butane} & \textit{2-Methylpropane} & \end{array}$ <p>In first three members of alkane series, branching is not possible. Therefore, we cannot have isomers.</p>	
19.	Give reasons for the following observations: (a) The element carbon forms a very large number of compounds. (b) Air holes of a gas burner have to be adjusted when the heated vessels get blackened by the flame.	3
ANS	(a) Carbon forms large number of compounds since carbon is small in size and can form stable covalent bonds (catenation) and it shows tetravalency. (b) Air holes of gas burner are made open (adjusted) so that air can pass through, which is needed for complete combustion, so that heated vessels do not get blackened.	
20.	What is meant by a functional group in an organic compound? Name the functional group present in (i) $\text{CH}_3\text{CH}_2\text{OH}$ (ii) CH_3COOH	3
ANS	Functional group is an atom or group of atoms or reactive part of compound, which determines chemical properties of compounds. (i) $-\text{OH}$ (Alcohol) (ii) $-\text{COOH}$ (Carboxylic acid)	
21.	An organic compound A commonly used in medicines & a good solvent on heating with conc H_2SO_4 forms a compound B, which on addition of 1 mole of Hydrogen & in presence of Nickel catalyst forms compound C which on combustion forms of CO_2 & H_2O . Identify Compound A, B, C & also write the equation	3
ANS	i) Compound A is <u>Ethanol</u> $\text{C}_2\text{H}_5\text{OH}$ commonly used in medicine & a good solvent. ii) On heating Ethanol with Conc H_2SO_4 , we get Ethene C_2H_4 $\text{CH}_3-\text{CH}_2\text{OH} \xrightarrow[\text{H}_2\text{SO}_4]{\text{Hot Conc.}} \text{CH}_2=\text{CH}_2 + \text{H}_2\text{O}$ <p>So Compound B is <u>Ethene</u></p>	

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	<p>iii) On addition of 1 mole of Hydrogen to Ethene we Ethane C₂H₆ $\text{CH}_2=\text{CH}_2 + \text{H}_2 \xrightarrow{\text{Ni}}$ CH_3-CH_3 So Compound C is <u>Ethane</u> iv) Combustion of Compound C $\text{C}_2\text{H}_6 + 3.5 \text{O}_2 \rightarrow 2\text{CO}_2 + 3 \text{H}_2\text{O} + \text{energy}$</p>	
22.	<p>Draw the structure of molecules i)CH₄ ii)O₂ iii)N₂</p>	3
ANS	<p>i) CH₄ molecules</p> <p>ii) O₂ Molecule</p> <p>iii) N₂ molecule</p>	
SECTION -D: CASE BASED QUESTIONS: (Q NO: 23- 24)		
23.	<p>As the reaction takes place, a sweet fruity smell can be sensed coming out from the testtube.</p>	4

CHAPTER 4
CARBON AND ITS COMPOUNDS

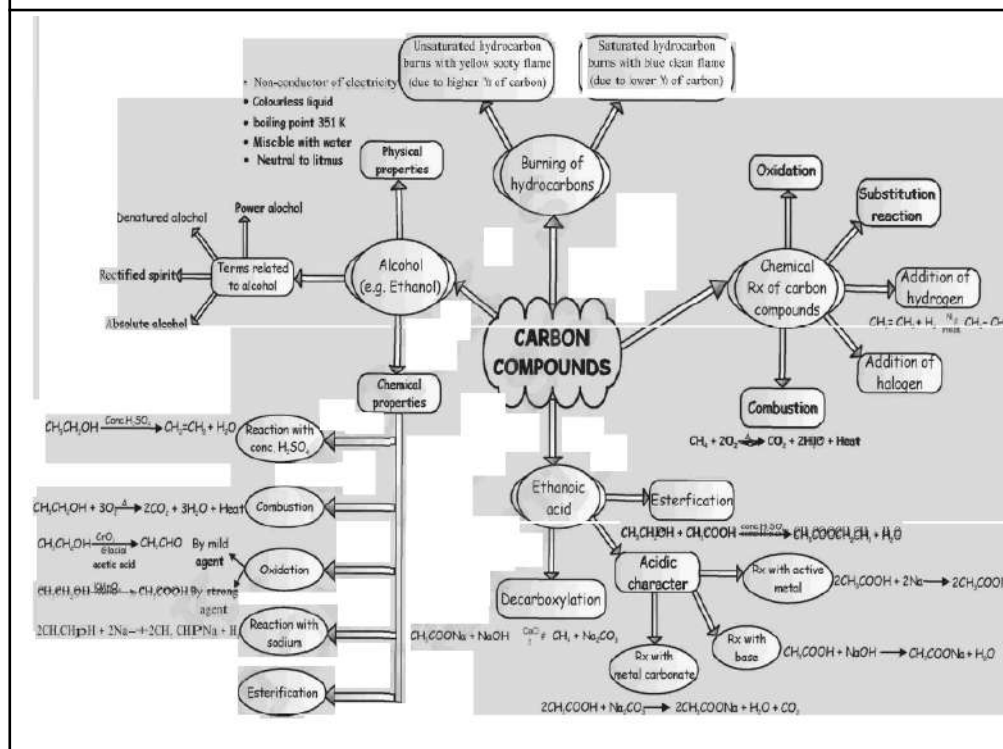
	 <p>a) What can be the reason behind the fruity smell? b) What are the reactants of the reaction mixture? What is the name of the chemical reaction involved. c) Why is it advised to heat the test-tube in a water bath and not directly?</p>	
ANS	<p>a) Ester formation b) Reaction mixture: Ethanol (Alcohol) + Acetic Acid (Carboxylic Acid) , Reaction: Esterification c) As Alcohol being one of the reactants and its highly flammable, it should not be heated directly. Hence heated in a water bath.</p>	
24.	<p>The addition of hydrogen across C =C is known as hydrogenation. Ethene reacts with hydrogen, if the heated gases are passed together over a catalyst nickel ethane is the product. Hydrogenation reactions similar to the reaction with Ethene are used in the manufacture of margarine from vegetable oils. The vegetable oils include corn oil and Sunflower oil. They are edible oil and contain long chain organic acids. The hydrocarbon chain of these acids contains one or more C=C double bonds: they are unsaturated molecules. Oil such as Sunflower oil are rich in poly and saturated molecules. This means that the melting point is relatively low and the oil remains liquid at normal temperature. By hydrogenation some but not all of the C=C double bonds, the liquid vegetable oil can be made into a solid but spreadable fat. Animal fat tend to be more saturated than vegetable oils and fats. The animal fats in cream can be made into butter. Mini doctors now believe that unsaturated fats are more healthy than saturated fats. i) Why are corn oil and sunflower oil called unsaturated molecules? ii) Which is better for human consumption- Animal fat or vegetable fat? Why? iii) How is ethane produced from ethene? Give the equation.</p>	4
ANS	<p>i. Corn oil and Sunflower oil contain long chain organic acids with some of the C=C double bonds. ii. Vegetable fat as they are unsaturated. iii. $C_2H_4 + H_2 \xrightarrow[\text{heat}]{\text{nickel}} C_2H_6$</p>	
SECTION – E: LONG ANSWER QUESTIONS:(Q NO: 25)		
25.	<p>Leela was bathing ,washing clothes etc in her sister's house , she noticed that there was no lather and a lot of soap was used up .She wondered it was not the same in her house. Her sister advised her to use detergent .</p>	5

CHAPTER 4
CARBON AND ITS COMPOUNDS

	<p>What was the difference that produced no lather & a lot of soap was used up in Leela's sisters house? Write the advantages & disadvantages of detergents over soap.</p>	
ANS	<p>The water in her sisters house was hard water & the Calcium & magnesium ions present in hard water react with soap to form the white curdy ppt called Scum & no lather is formed & a lot of soap is used up in trying to remove the hardness & gets wasted. In her house the water was soft & soap forms lather easily the soap in the form of micelle is able to clean any dirt . Advantages of Detergent-</p> <p>i) Synthetic detergents form lather easily even in hard water.</p> <p>ii) They have a better cleansing action.</p> <p>Disadvantages of Detergents-</p> <p>i) are non biodegradable & cause of water pollution.</p>	

Sl no.	Important Video link
1	https://www.youtube.com/watch?v=1u2flgAL_cg
2	https://www.youtube.com/watch?v=YnyYsEJB80I
3	https://www.youtube.com/watch?v=tpx7zP2M0Nw

Short cut Tis/ concept map



CHAPTER 4 CARBON AND ITS COMPOUNDS

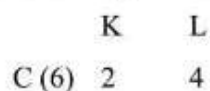
Introduction :

- The element carbon is non-metal. Its symbol is C.
- Carbon is a versatile element the percentage of carbon present in earth crust in form of mineral is 0.02% and in atmosphere as CO₂ is 0.03%.
- All the living things, plants and animals are made up of carbon based compounds.

Carbon always form covalent bonds :

The atomic number of carbon is 6.

Electronic configuration :

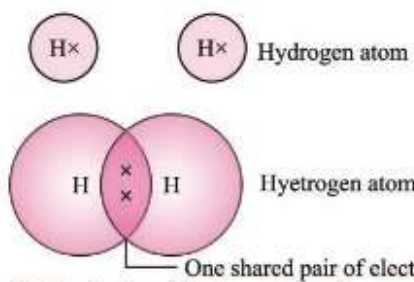


How carbon attain noble gas configuration ?

- (i) Carbon is tetravalent, it does not form ionic bond by either losing four electrons (C⁴⁺) or by gaining four electrons (C⁴⁻). It is difficult to hold four extra electron and would require large amount of energy to remove four electrons. So, carbon can form bond by sharing of its electrons with the electrons of other carbon atom or with other element and attain noble gas configuration.
- (ii) The atoms of other elements like hydrogen, oxygen and nitrogen, chlorine also form bonds by sharing of electrons.
- (iii) The bond formed by sharing of electrons between same or different atoms is covalent bond.

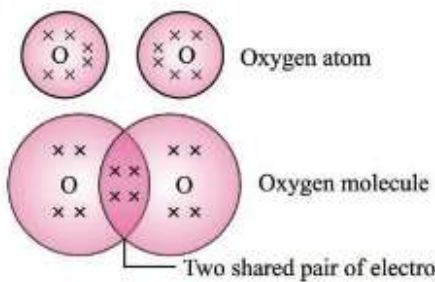
CHAPTER 4
CARBON AND ITS COMPOUNDS

(i) H_2



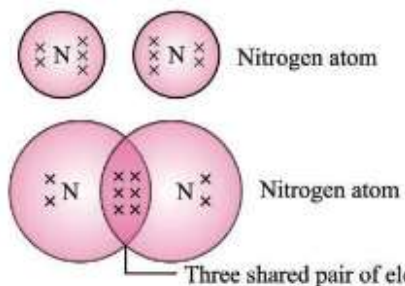
H – H single bond between hydrogen atoms

(ii) O_2



O = O double bond between oxygen atoms

(iii) N_2



N ≡ N triple bond between nitrogen atoms

CHAPTER 4
CARBON AND ITS COMPOUNDS

Physical Properties of Covalent Compounds

- (a) Covalent compounds have low melting and boiling points as they have weak intermolecular force.
- (b) They are generally poor conductor of electricity as electrons are shared between atoms and no charged particles are formed.

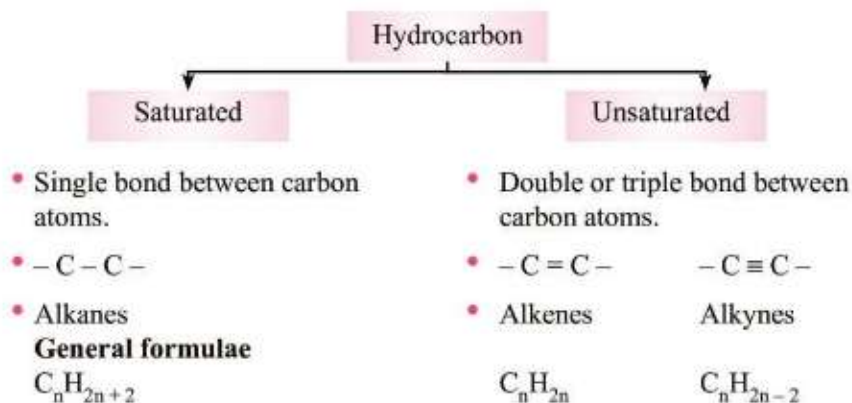
Versatile Nature of Carbon

The two characteristic properties of carbon element which lead to the formation of large number of compounds :

- (i) **Catenation** : Carbon can link with carbon atoms by means of covalent bonds to form long chains, branched chains and closed ring compound. Carbon atoms may be linked by single, double or triple bonds.
- (ii) **Tetravalency** : Carbon has 4 valence electrons. Carbon can bond with four carbon atoms, monovalent atoms, oxygen, nitrogen and sulphur.

Saturated and Unsaturated Carbon Compounds

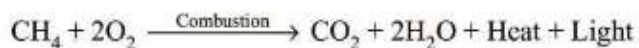
Compounds made up of hydrogen and carbon are called hydrocarbon.



CHAPTER 4 CARBON AND ITS COMPOUNDS

Chemical Properties of Carbon Compounds

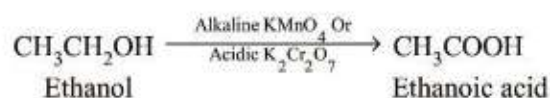
(a) Combustion



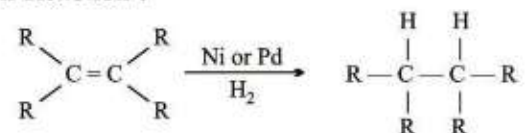
- Carbon and its compounds are used as fuels because they burn in air releasing lot of heat energy.
- Saturated hydrocarbon generally burn in air with blue and non-sooty flame.
- Unsaturated hydrocarbon burns in air with yellow sooty flame because percentage of carbon is higher than saturated hydrocarbon which does not get completely oxidized in air.

(b) Oxidation

Alcohols can be converted to carboxylic acid in presence of oxidizing agent alkaline KMnO_4 (potassium permanganate) or acidic potassium dichromate.



(c) Addition Reaction :



Unsaturated hydrocarbon add hydrogen in the presence of catalyst palladium or nickel. Vegetable oils are converted into vegetable ghee using this process. It is also called hydrogenation of vegetable oils.

(d) Substitution Reaction :



CHAPTER 4
CARBON AND ITS COMPOUNDS

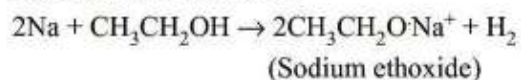
Important Carbon Compounds : Ethanol and Ethanoic acid

Physical Properties of Ethanol

- Colourless, pleasant smell and burning taste.
- Soluble in water.
- Volatile liquid with low boiling point of 351 K.
- Neutral compound.

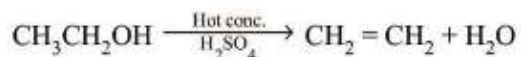
Chemical Properties

(i) Reaction with Sodium :



This reaction is used as a test for ethanol by evolution of H_2 gas (Burn with pop sound).

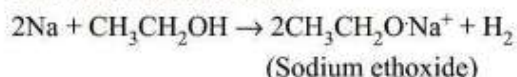
(ii) Dehydration :



CHAPTER 4 CARBON AND ITS COMPOUNDS

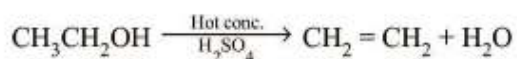
Chemical Properties

(i) Reaction with Sodium :



This reaction is used as a test for ethanol by evolution of H_2 gas (Burn with pop sound).

(ii) Dehydration :

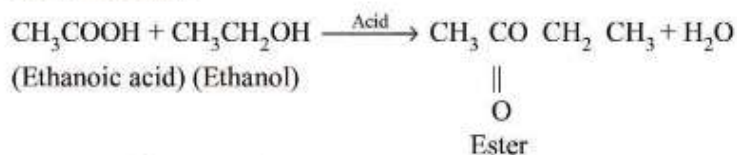


Physical Properties of Ethanoic acid

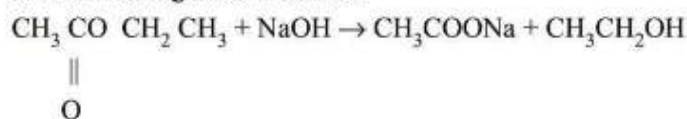
- Colourless liquid having sour taste and have smell of vinegar.
- Boiling point is 391 K.
- When pure CH_3COOH is freezed, it forms colourless ice like solid. So it is called glacial acetic acid.

Chemical Properties

(i) Esterification :

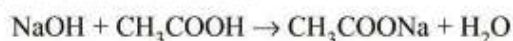


Sweet smelling ester is formed.



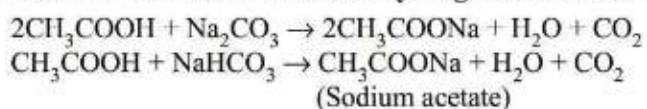
This is saponification as soap is prepared by this.

(ii) Reaction with base :



CHAPTER 4 CARBON AND ITS COMPOUNDS

(iii) Reaction with carbonates and hydrogen carbonates :

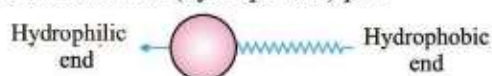


Soaps and Detergents

- Soap is sodium or potassium salt of long chain carboxylic acid. *E.g.*, $\text{C}_{17}\text{H}_{35}\text{COONa}^+$
- Soaps are effective only in soft water.
- Detergents are ammonium or sulphonate salt of long chain of carboxylic acid.
- Detergents are effective in both hard and soft water.

Soap molecule has :

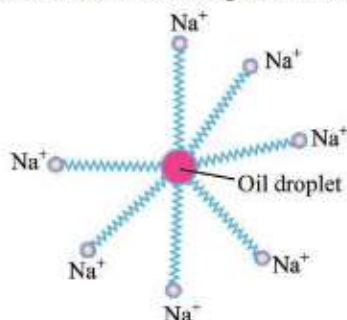
- (i) Ionic (hydrophilic) part
- (ii) Long hydrocarbon chain (hydrophobic) part



Structure of soap molecule

Cleansing Action of Soap

- Most dirt is oily in nature and hydrophobic end attaches itself with dirt and the ionic end is surrounded with molecule of water. This results in formation of a radial structure called micelles.
- Soap micelles help to dissolve dirt and grease in water and cloth gets cleaned.



- The magnesium and calcium salt present in hard water react with soap molecule to form insoluble product called scum. This scum creates difficulty in cleansing action.
- By use of detergent, insoluble scum is not formed with hard water and cloths get cleaned effectively.

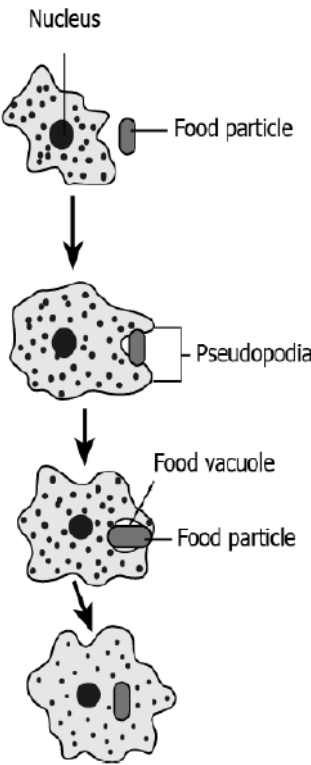
CHAPTER 5

LIFE PROCESSES

Q NO.	QUESTION	MARK
SECTION -A: MCQ (QN NO 1-12)		
1	The contraction and expansion movement of the walls of the food pipe is called: (a) Translocation (b) Transpiration (c) Peristaltic movement (d) Digestion	1
Ans	Option (c)	
2	When a few drops of iodine solution are added to rice water, the solution turns blue-black in colour. This indicates that rice water contains: (a) Fats (b) Complex proteins (c) Starch (d) Simple proteins	1
Ans	Option (c)	
3	Which of the following is the correct sequence of body parts in the human alimentary canal? (a) Mouth → stomach → small intestine → large intestine → oesophagus (b) Mouth → oesophagus → stomach → small intestine → large intestine (c) Mouth → stomach → oesophagus → small intestine → large intestine (d) Mouth → oesophagus → stomach → large intestine → small intestine	1
Ans	Option (b)	
4	The site of photosynthesis in the cells of a leaf is (a) chloroplast (b) mitochondria (c) cytoplasm (d) protoplasm	1
Ans	Option (a)	
5	Which of the following events in the mouth cavity will be affected if salivary amylase is lacking in the saliva? (a) Starch breaking down into sugars. (b) Proteins breaking down into amino acids. (c) Absorption of vitamins. (d) Fats breaking down into fatty acids and glycerol.	1
Ans	Option (a)	
6	Which plant tissue transports water and minerals from the roots to the leaf? (a) Xylem (b) Phloem (c) Parenchyma (d) Collenchyma	1
Ans	Option (a)	

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7	<p>Which of the equations shows the correct conversion of CO₂ and H₂O into carbohydrates in plants?</p> <p>(a)</p> $6\text{CO}_2 + 6\text{H}_2\text{O} \xrightarrow[\text{Heat energy}]{\text{Chlorophyll}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 12\text{H}_2\text{O}$ <p>(b)</p> $6\text{CO}_2 + 6\text{H}_2\text{O} \xrightarrow[\text{Sunlight}]{\text{Chlorophyll}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 12\text{H}_2\text{O}$ <p>(c)</p> $6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow[\text{Sunlight}]{\text{Chlorophyll}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$ <p>(d)</p> $6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow[\text{Heat energy}]{\text{Chlorophyll}} \text{C}_6\text{H}_{12} + 6\text{O}_2 + 6\text{H}_2\text{O}$	1
Ans	Option (c)	
8	<p>The given image shows how Amoeba obtains nutrition.</p>  <p>How is this process advantageous for amoeba?</p>	1

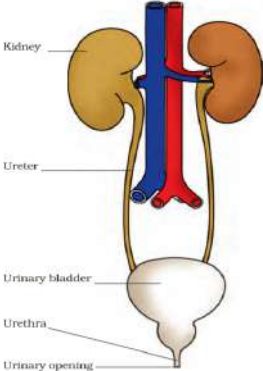
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	(a) Capturing food takes less time (b) Complex food can be digested easily (c) More amount of food can be consumed (d) Fast distribution of nutrition within the body	
Ans	Option (d)	
9	Temporary finger like extensions on amoeba are called a) Cell membrane b) Cell wall c) Pseudopodia d) Cilia	1
Ans	Option (c)	
10	Blood consists of what fluid medium? a) Lymph b) Platelets c) Plasma d) All of these	1
Ans	Option (c)	
11	Which is the first enzyme to mix with food in the digestive tract? (a) Pepsin (b) Cellulase (c) Amylase (d) Trypsin	1
Ans	(c) Amylase	
12	The filtration units of kidneys :- (a) ureter (b) urethra (c) neurons (d) nephrons	1
Ans	(d) nephrons	
ASSERTION REASONING QUESTIONS: (QN NO 13-14)		
	Assertion: (A). Reason: (R) CHOOSE THE CORRECT OPTION AS PER THE STATEMENTS GIVEN IN ASSERTION AND REASON: a) Assertion and Reason both are correct and R is the correct explanation of A. b) Assertion and Reason both are correct but R is not the correct explanation of A. c) Assertion is true but Reason is false. d) Assertion and Reason both are incorrect.	
13	Assertion (A): The purpose of making urine is to filter out undigested food from intestine Reason (R): Kidneys filter the waste and produce urine	1
Ans	(d) d) Assertion and Reason both are incorrect.	
14	Assertion (A): The inner lining of the small intestine has numerous finger-like projections called villi. Reason (R) : The villi increase the surface area for absorption.	1
Ans	(a) Assertion and Reason both are correct and R is the correct explanation of A.	

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	SECTION -B: PICTORIAL, KNOWLEDGE AND UNDERSTANDING (QN NO 15-22)	
15	Give one reason why multicellular organisms require special organs for exchange of gases between their body and their environment.	2
Ans	In unicellular organisms the entire body of the organism is in contact with the environment hence exchange of materials can take place but, in multicellular organisms the entire body of the organism is not in contact with the environment and hence simple diffusion is not helpful.	
16	Draw a diagram of human urinary system	2
Ans		
17	What is villi? What are its functions?	2
Ans	Finger-like projections present in the inner lining of the small intestine are called villi. They increase the surface area for the absorption of digested food in the small intestine.	
18	State the role of the following in human digestive system : (I) Digestive enzymes (II) Hydrochloric acid	2
Ans	<u>Digestive enzymes</u> – Foods need to be broken into their small or simpler molecules so that they can be absorbed into the bloodstream. However, the physical breakdown of food is not enough. Enzymes are hence needed for the chemical breakdown of food and speeding up the digestive process. The products of digestion can hence be small enough to be absorbed. <u>Hydrochloric acid</u> – Hydro chloric acid helps to kill the germs which might have entered in to the system through food. It creates acidic medium for the pepsin to act on food to breakdown proteins.	
19	List any 2 functions of the major circulatory fluid of our body.	2
Ans	(i) Transport of O ₂ (from lungs to different parts of the body) and CO ₂ (from tissues/ organs, back to lungs). (ii) Transport of digested food (glucose, amino acids, etc.) from Small Intestine to various parts of the body. (iii) Transport hormones from their site of production (endocrine organs) to the site of action (target organs or tissues in different parts of the body). (iv) Carry nitrogenous wastes of metabolism from various tissues/ organs, to kidneys, to be removed as urine.	

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	(v) Harmful substances or toxins are transported to the liver for detoxification. (vi) Antibodies produced by the leucocytes provide immunity to the body. (vii) Help maintain body temperature (thermoregulation) by the process of sweating (perspiration) (ANY TWO)											
20	Differentiate between difference between breathing and respiration.	2										
Ans	<table border="1"> <thead> <tr> <th>Breathing</th> <th>Respiration</th> </tr> </thead> <tbody> <tr> <td>(i) It is a physical process. It involves inhalation of fresh air and exhalation of foul air.</td> <td>It is a biochemical process. It involves exchange of respiratory gases and also oxidation of food.</td> </tr> <tr> <td>(ii) It is an extracellular process</td> <td>It is both an extracellular as well as intracellular process.</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>	Breathing	Respiration	(i) It is a physical process. It involves inhalation of fresh air and exhalation of foul air.	It is a biochemical process. It involves exchange of respiratory gases and also oxidation of food.	(ii) It is an extracellular process	It is both an extracellular as well as intracellular process.					
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(ii) It is an extracellular process	It is both an extracellular as well as intracellular process.											
21	Why is the separation of oxygenated and deoxygenated blood in mammals and birds necessary?	2										
Ans	Mammals and birds are warm-blooded animals. They control body temperature and do not depend on the environment to regulate body temperature. So birds and mammals need optimum oxidation of glucose which is possible with a good supply of oxygen without mixing oxygenated and deoxygenated blood.											
22	How is food transported in plants?	2										
Ans	The food is transported by phloem to the plant parts like roots, fruits, seeds and growing regions. This process is called translocation. In the phloem, sieve tubes are present, which, together with companion cells, translocate food in upward and downward directions. ATP is the energy provided for translocation.											
	SECTION -C : APPLICATION,EVALUATE,KNOWLEDGE AND ANALYSIS:(Q NO: 23-29)											
23	List the three steps in photosynthesis. Do all steps occur simultaneously.	3										
Ans	(i) Absorption of sun's energy by Chlorophyll (ii) Conversion of light energy into chemical energy; and, splitting of water into hydrogen and oxygen using the light energy. (iii) Reduction of carbon dioxide into carbohydrates like glucose using the chemical energy. No, all steps don't occur simultaneously.											
24	Name the respiratory organs of (i) fish (ii) mosquito (iii) earthworm.	3										

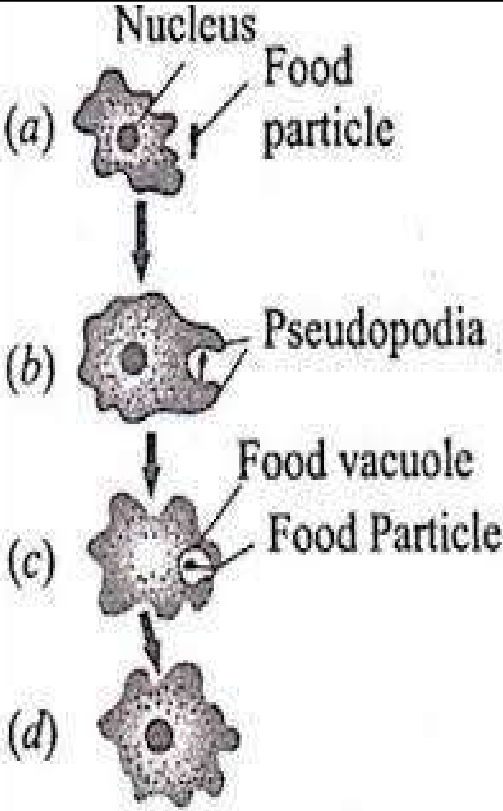
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Ans	Fish – gills, Mosquito – Trachea (air tubes), Earthworm – moist skin	
25	(i) Write the balanced chemical equation for the process of photosynthesis, (ii) When do the desert plants take up carbon dioxide and perform photosynthesis ?	3
Ans	.(i) Photosynthesis can be represented using a chemical equation. The overall balanced equation is $6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow{\text{Sunlight \& Chlorophyll}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{O}_2$ (ii) Desert plants open up their stomata during night and take in CO_2 . Stomata remains close during the day time to prevent the loss of water by transpiration. They store the CO_2 in their cells until the sun comes out and they can carry on with photosynthesis during the day time.	
26	What advantage over an aquatic organism does a terrestrial organism have with regard to obtaining oxygen for respiration?	3
Ans	Adaptation of terrestrial organism over aquatic organism for efficient uptake of oxygen from air – (i) Increased respiratory surface area. (ii) Very fine and delicate surface for easy exchange of oxygen and carbon – dioxide. (iii) Placement of respiratory surface within the body for protection (iv) Mechanism for moving the air in and out of respiratory surface where the oxygen is absorbed.	
27	Explain the process of nutrition in Amoeba.	3
Ans	Amoeba ingests food particles with the help of its pseudopodia. The ingested food particle or phagosome fuses with lysosome to form food vacuole. The digested food passes out of the vacuole into cytoplasm. The undigested matter is thrown out.	

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	 <p>The diagram illustrates the process of feeding in an amoeba in four stages:</p> <ul style="list-style-type: none"> (a) A star-shaped amoeba with a central nucleus and a nearby food particle. (b) The amoeba extends pseudopodia towards the food particle. (c) The pseudopodia surround the food particle, forming a food vacuole. (d) The food particle is digested within the food vacuole. 	
28	Mention the three kinds of cells present in blood and write one function of each.	3
Ans	<p>There are three types of cells present in the blood. They are red blood cells, white blood cells and platelets.</p> <p>Red blood cells are biconvex and contain haemoglobin to transport oxygen from the lungs to body cells and take carbon dioxide from the cells to the lungs.</p> <p>White blood cells are the body's defence cells and fight against diseases and infections.</p> <p>Platelets are responsible for blood clotting during injuries.</p>	
29	<p>In each of the following situations, what happens to the rate of photosynthesis?</p> <ul style="list-style-type: none"> • Cloudy days • No rainfall in the area • Good manuring in the area 	3
Ans	<ol style="list-style-type: none"> 1. Photosynthesis is reduced due to the low intensity of the light. 2. The rate of photosynthesis is not affected in the case of no rainfall. 3. When manuring is done, soil fertility is increased, but the rate of photosynthesis is not affected. 	
SECTION -D: CASE BASED QUESTIONS: (Q NO: 30- 31)		
30	Vicky experienced muscular cramps during the training session for his upcoming football match. Mr. Sharma, his coach advised him on a schedule of some aerobic exercises to overcome his problem of muscular	4

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	<p>cramps. Rishi followed his coach's advice and did not face the problem of muscular cramps again during his match. (Do any FOUR)</p> <ol style="list-style-type: none"> Which life process is depicted by the above passage? <ol style="list-style-type: none"> Respiration Digestion Nutrition Excretion Lack of oxygen in muscles often leads to cramps due to <ol style="list-style-type: none"> Conversion of pyruvate to ethanol Conversion of glucose to pyruvate Conversion of pyruvate to glucose Conversion of pyruvate to lactic acid Lactic acid is produced by _____ respiration in muscle cells. <ol style="list-style-type: none"> aerobic anaerobic oxidative none of these Why there is an increase in lactic acid concentration in the blood at the beginning of the exercise? <ol style="list-style-type: none"> Lack of oxygen Excess of oxygen Lack of carbon dioxide Excess of carbon dioxide What else can be done for quick relief from muscular cramps ? <ol style="list-style-type: none"> Massage by applying heating pad or an ice pack painkillers all of these 	
Ans	<ol style="list-style-type: none"> (a) (d) (b) (a) (a) 	
31	<p>Blood transport food and waste materials in our bodies. It consists of plasma as a fluid medium. A pumping organ is required to push the blood around. The blood flows through the chambers of the organ in a specific manner and direction. While flowing throughout the body, blood exert a pressure against the wall or a vessel. (Do any FOUR)</p> <ol style="list-style-type: none"> Which life process is depicted by the above passage? <ol style="list-style-type: none"> Respiration Digestion Transportation Excretion Name the blood pumping organ. <ol style="list-style-type: none"> Lungs Heart Kidney 	4

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	<p>(d) Liver</p> <p>3. Oxygenated blood from lungs enters the left atrium through</p> <p>(a) Vena cava (b) Pulmonary artery (c) Pulmonary vein (d) Aorta</p> <p>4. Deoxygenated blood leaves through the right ventricle through</p> <p>(a) Vena cava (b) Pulmonary artery (c) Pulmonary vein (d) Aorta</p> <p>5. Which of the following statements is true about the heart?</p> <p>(i) It is a hollow muscular organ. (ii) It is a four chambered having three atria and one ventricle. (iii) It has different chambers to prevent the oxygen - rich blood from mixing with the blood containing carbon dioxide. (iv) Arteries always carry blood away from the heart.</p> <p>(a) (i) and (ii) (b) (ii) and (iii) (c) (i), (ii) and (iii) (d) (i), (iii) and (iv)</p>	
Ans	<p>1. (c) 2. (b) 3. (d) 4. (b) 5. (d)</p>	
SECTION – E: LONG ANSWER QUESTIONS:(Q NO: 32)		
32	<p>(a) “The breathing cycle is rhythmic whereas exchange of gases is a continuous process”. Justify this statement. (b) What happens if the conducting tubes of the circulatory system develop a leak? State in brief, how could this be avoided? (c) How does the opening and closing of stomata take place?</p>	5
Ans	<p>(a) The breathing cycle involves inhalation and exhalation of air due to alternate expansion and contraction of thoracic cavity. Thus it is a rhythmic process. But exchange of gases is a continuous process as it takes place between the blood and each and every cell, by diffusion. (b) The circulatory system will become inefficient if it develops a leak. This could be avoided by maintaining a normal blood pressure. (c) When water flows into the guard cells, the guard cells swell and the stomatal pore opens up. When water moves out the guard cells shrink and the stomatal pore closes.</p>	
	<p>(a) Name the organs that form the excretory system in human beings. (b) Describe in brief how urine is produced in human</p>	
	<p>a) A pair of kidneys, a pair of ureters, a urinary bladder and a urethra. b) A kidney has a large number of filtration units called nephrons. Each nephron has cup shaped Bowman's capsule containing a</p>	

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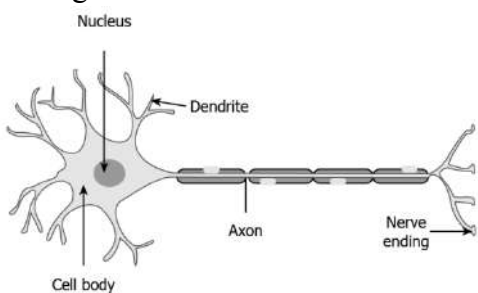
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	<p>bunch of capillaries called glomerulus. Blood gets filtered in the glomerulus. Filtrate gets collected in Bowman's capsule. Some useful substances such as glucose, amino acids, salts and water are selectively re-absorbed as urine flows through nephron tube. The urine formed in each kidney is eventually stored in the urinary bladder.</p>	
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Sl no.	Short cut Tis/ concept map	
1	<p>Life Process Maintenance of living organism is essential even if they are moving, resting or even sleeping. The process which together perform the function of maintenance of "life" are called as life process Nutrition, Respiration, Circulation, Excretion are examples of essential life processes. In unicellular organisms, all these processes are carried out by that single cell.</p>	<p>Requirements for Photosynthesis A. Sunlight :- for plants sun is the basic source of radiant energy. B. Chlorophyll :- These are green pigments present in chloroplast. C. Water :- Plant's root absorb water from the soil. Water is transported to leaves by a special type of tissue called xylem. D. Carbon dioxide :- Terrestrial plants obtain CO₂ from the atmosphere through the small opening present on leaves called stomata.</p> <p>Mechanism of Photosynthesis (i) Absorption of light energy by chlorophyll. (ii) Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen. (iii) Reduction of carbon dioxide to carbohydrates.</p>
	<p>Life Process</p> <p style="text-align: center;">Nutrition</p> <pre> graph TD Nutrition --> Autotrophic Nutrition --> Heterotrophic Autotrophic --> Chemoautotrophs["Chemoautotrophs (Purple sulphur bacteria)"] Autotrophic --> Photoautotrophs["Photoautotrophs (Green plants)"] Heterotrophic --> Saprophytic["Saprophytic (Fungi)"] Heterotrophic --> Parasitic["Parasitic (Cuscuta, lice)"] Heterotrophic --> Holozoic Holozoic --> Frugivore["Frugivore (birds, bats)"] Holozoic --> Sanguinivore["Sanguinivore (Mosquito, leeches)"] Holozoic --> Detrivores["Detrivores (Earthworm)"] Frugivore --> Herbivore["Herbivore (deer, rabbits)"] Sanguinivore --> Carnivore["Carnivore (Lion, Tiger)"] Detrivores --> Omnivore["Omnivore (Bear, Humans)"] </pre> <p>Nutrition in Plants The process by which green plants synthesize food from simple substances i.e., carbon dioxide and water in the presence of sunlight and chlorophyll is called Photosynthesis".</p> $6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow[\text{Sunlight}]{\text{Chlorophyll}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ <p style="text-align: center;">(Glucose) + 6H₂O</p>	

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Q NO.	QUESTION	MARK
	SECTION -A: MCQ (QN NO 1-10)	
1	In a neuron, conversion of electric signal to chemical reaction occurs at a) Cell body b) Dendritic end c) Axonal terminal d) Axon	1
Ans	C) Axonal terminal	
2	Posture and balance of the body is controlled by (a) Pons (b) Medulla oblongata (c) Cerebellum (d) Cerebrum	1
Ans	(c) Cerebellum	
3	The main function of abscisic acid in plants is (a) to promote cell division. (b) to inhibit growth. (c) to promote growth of stem. (d) to increase the length of cells	1
Ans	(b) to inhibit growth.	
4	_____ consists of brain and spine. a)CNS b)PNS c)ANS d)SNS	1
Ans	a) CNS	
5	Which nerves transmit impulses from the central nervous system towards muscle cells? (a) Sensory nerves (b) Motor nerves (c) Relay nerves (d) Cranial nerves	1
Ans	(b) Motor nerves	
6	The growth of tendrils in pea plant is due to _____ a) Effect of gravity b) Effect of chemicals c) Rapid cell divisions in tendrillar cells that are away from support d) Rapid cell division in tendrillar cells in contact with the support	1
Ans	c) Rapid cell divisions in tendrillar cells that are away from support	
7	The image shows structure of a neuron  After our nose senses a smell, which option shows the mechanism of the travelling of sense in our body?	1


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	(a) olfactory receptors- dendritic tip of a nerve cell- - axon- nerve ending-release of signal dendritic tip of other nerve cell (b) olfactory receptors- dendritic tip of a nerve cell- axon- cell body-release of signal dendritic tip of other nerve cell (c) gustatory receptors- dendritic tip of a nerve cell- cell body- axon-release of signal dendritic tip of other nerve cell (d) gustatory receptors- dendritic tip of a nerve cell- axon- cell body-release of signal dendritic tip of other nerve cell	
Ans	(b) olfactory receptors- dendritic tip of a nerve cell- axon- cell body-release of signal dendritic tip of other nerve cell	
8	A doctor advised a person to take an injection of insulin because _____ a) His blood pressure was low b) His heart was beating slowly c) He was suffering from goitre d) His sugar level in blood was high	1
Ans	d) His sugar level in blood was high	
9	Identify which of the following statements about thyroxin is incorrect? (a) Thyroid gland requires iodine to synthesize thyroxin. (b) Thyroxin is also called thyroid hormone. (c) It regulates protein, carbohydrates and fat metabolism in the body. (d) Iron is essential for the synthesis of thyroxin	1
Ans	(d) Iron is essential for the synthesis of thyroxin	
10	Which of the following is not an involuntary action a)Salivation b)Chewing c)Heart Beat d)Vomiting	1
Ans	b) Chewing	
ASSERTION REASONING QUESTIONS: (QN NO 11-12)		
<p>Assertion: (A). Reason: (R) CHOOSE THE CORRECT OPTION AS PER THE STATEMENTS GIVEN IN ASSERTION AND REASON: a) Assertion and Reason both are correct and R is the correct explanation of A. b) Assertion and Reason both are correct but R is not the correct explanation of A. c) Assertion is true but Reason is false. d) Assertion and Reason both are incorrect.</p>		
11	Assertion : Phototropism is caused by auxin. Reason : When light is coming from one side of the plant, auxin diffuses towards the shady side of the shoot.	1
Ans	(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).	
12	Assertion : Nerve impulse is a one way conduction. Reason : Nerve impulse is transmitted from dendrite to axon terminals.	1
Ans	(c) Assertion (A) is true but reason (R) is false.	


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	Nerve impulses are always transmitted across a synapse from the axon terminals of one neuron to the dendrite/cell body of the next neuron but never in the reverse direction	
	SECTION -B: PICTORIAL, KNOWLEDGE AND UNDERSTANDING (QN NO 13-17)	
13	Mark the following parts in given diagram. a) Cerebellum b) medulla oblongata	2
		
Ans		
14	What are the differences between nastic and tropic movement	2
Ans	Tropic movement and nastic movements are both in response to external stimuli, but tropisms are relying on the path of the stimulus nastic movements do not rely on the path of a stimulus.	
15	Why is the use of iodised salt advisable?	2
Ans	Iodine is necessary for the thyroid gland to make the hormone thyroxin. Thyroxin regulates carbohydrates protein and fat metabolism in the body to provide balance for growth. Deficiency of iodine can lead to Goitre.	
16	Why our body starts sweating when temperature increases?	2
Ans	Our hypothalamus (a small region in your brain) tells eccrine sweat glands distributed all over your body that it's time to start cooling you down by producing sweat.	
17	(i) Name the hormones that are released in human males and females when they reach puberty. (ii) Name a gland associated with brain. Which problem is caused due to the deficiency of the hormone released by this gland?	2
Ans	i) Testes in males produces hormone testosterone. Ovaries in females produces hormone oestrogen. ii] Pituitary gland present in the brain is responsible for body growth, development of bones and muscles (if excess- gigantism) (if less-dwarfism).	
	SECTION -C: APPLICATION, EVALUATE, KNOWLEDGE AND ANALYSIS:(Q NO: 18-22)	
18	What is Synapse? In a neuron cell how is an electrical impulse created and what is the role of synapse in this context?	3
Ans	Synapse is the joining point between the axon of one neuron and dendrite of the second neuron. It is also found as a junction between two nerve cells, consisting of a minute gap. When an impulse gets to the end of one neuron and has to be sent down to the next neuron, the synapse acts as a bridge. The signal arrives at the end of one neuron (close to the synapse) as an electrical signal. The electrical impulses are carried out by dendrite of one nerve cell, then it is passed to the cyton of the same nerve cell. Then the cyton passes that electrical impulse to the axon. Then the cyton pass impulses to	

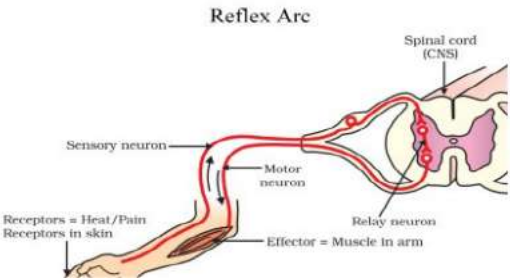
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	another nerve cells through the synapse, this process continues from one neuron to other. Finally, it is received by the brain through the neuron.	
19	Define geotropism Draw a labelled diagram of a plant showing geotropic movements of its parts.	3
Ans	<p>The movement of the growth of the roots downwards and the shoots upwards under the stimuli of gravity is called geotropism. The movement of the plant towards or away from the stimulus gravity.</p> 	
20	A cheetah, on seeing a prey, moves towards him at a very high speed. What causes the movement of his muscles? How does the chemistry of cellular components of muscles change during this event?	3
Ans	<p>A cheetah on seeing a prey generates a nerve impulse which reaches the muscles and the muscle fibre moves. The muscles cell will then move by changing their shape so that muscle cells shorten</p>	
21	Write the function(s) of the following plant hormones a)Auxin b)Gibberellin c) Cytokinin	3
Ans	<p>a. Auxins promote cell elongation, root formation, cell division, etc. It also promotes fruit growth. b. Gibberellins stimulate stem elongation, seed germination and flowering. c. Cytokinin help in breaking the dormancy of seeds and buds. They delay ageing in leaves. They also promote the opening of stomata.</p>	
22	<p>a. Name the part of brain which controls (1) Voluntary action (2) Involuntary action. b) Name one gustatory receptor and one olfactory receptor present in human beings. c)Name the hormone which increase the fertility in males</p>	3
Ans	<p>a) (1) Voluntary actions - cerebellum; (2) Involuntary action — medulla oblongata. b) Gustatory receptor present in tongue to detect taste. Olfactory receptor present in nose to detect smell b) Testosterone</p>	
	SECTION -D: CASE BASED QUESTIONS: (Q NO: 23- 24)	
23	The simplest form of response in the nervous system is reflex action. This is a rapid, automatic response to a stimulus which is not under the voluntary control of the brain. It is described as an involuntary action. Thus, a reflex action is one which we perform automatically. It is a	4

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	<p>comparatively simple form of behaviour in which the same stimulus produces the same response every time.</p>  <p>Moving our hand away on touching a hot plate is an example of reflex Action. State true or false.</p> <p>i) True ii) False</p> <p>2. A reflex action is not an automatic response to a stimulus. i) True ii) False</p> <p>3. The pathway (or route) taken by nerve impulses in a reflex action is called i) Reflex arc ii) Reflex action</p> <p>4. Reflex arc is controlled by _____</p>	
Ans	i) True ii) False iii) reflex arc iv) Spinal cord	
24	<p>We also think about our actions. Writing, talking, moving a chair, clapping at the end of a programme are examples of voluntary actions which are based on deciding what to do next. So, the brain also has to send messages to muscles. This is the second way in which the nervous system communicates with the muscles. The communication between the central nervous system and the other parts of the body is facilitated by the peripheral nervous system consisting of cranial nerves arising from the brain and spinal nerves arising from the spinal cord. The brain thus allows us to think and take actions based on that thinking.</p> <p>i) What are the three major parts of the brain? ii) What are the function of medulla? iii) Which fluid is present in our brain? iv) What is the function of hypothalamus?</p>	4
Ans	<p>i)Forebrain, Midbrain and hindbrain. ii)It controls all the involuntary action such as blood pressure, salivation, vomiting, etc. iii)Cerebrospinal fluid. iv)It regulates homeostasis, releases hormones. i)Forebrain, Midbrain and hindbrain. ii)It controls all the involuntary action such as blood pressure, salivation, vomiting, etc. iii)Cerebrospinal fluid. iv)It regulates homeostasis, releases hormones.</p>	
SECTION – E: LONG ANSWER QUESTIONS:(Q NO: 25)		
25	<p>a) How does the body regulate hormone level. Explain with an example. b) Why is chemical communication better than electrical impulses as a mean of communication between cells in a multi-cellular organisms.</p>	5(2+3)
Ans	a) It is so important that hormones should be secreted in precise quantities, to maintain the timing and amount of hormone released are regulated by	

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	<p>feedback mechanisms. For example, if the sugar levels in blood rise, they are detected by the cells of the pancreas which respond by producing more insulin. As the blood sugar level falls, insulin secretion is reduced</p> <p>b) Electrical impulses have limited access to only those cells those are connected by nervous tissue/neurons whereas chemical signals can reach each and every cell of the body. Cells need time to reset in order to create repeated/ new electrical impulses whereas no such time is required for chemical communication</p>	
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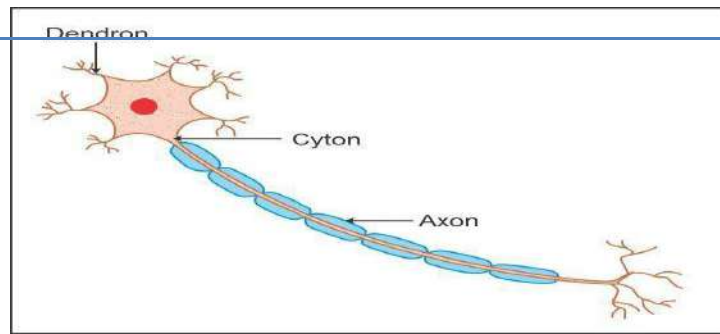
Sl no.	Important Video link
1	https://www.youtube.com/watch?v=OvVI8rOEncE
2	https://www.youtube.com/watch?v=TTLgTIipmA8
3	

Sl no.	Short cut Tis/ concept map
1	<ul style="list-style-type: none"> ● Stimulus: An agent or sudden change in the external or internal environment which causes a change in an organism or any of its body parts. ● Response: The change in organisms resulting from a stimulus. ● Receptors: Nerve cells which initiate waves of impulses towards the central nervous system on receiving a stimulus. ● Effectors: Muscles or glands which contract or secrete substances on receiving an impulse from the brain or spinal cord. <p>Functions of the Nervous System</p> <hr/> <ul style="list-style-type: none"> ● Keeps us informed about the outside world through sensory organs. ● Controls and harmonizes all voluntary muscular activities. Example- running and writing. ● Enables us to remember, think and reason. ● Regulates involuntary activities such as breathing and beating of the heart. <p>Neuron</p> <hr/> <ul style="list-style-type: none"> ● A neuron is the structural and functional unit of the nervous system. <p>The three main parts of a neuron are:</p> <ul style="list-style-type: none"> ● Cell Body- It has a well-defined nucleus and granular cytoplasm. ● Dendrites- Dendrites are branched cytoplasmic projections of the cell body. ● Axon- It is a long process of the cell body. The end portions of the axons have swollen bulb-like structures which store neurotransmitters.

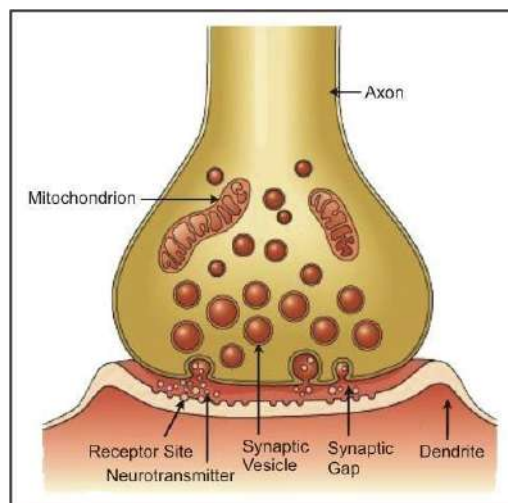
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Synapse



- The **synapse** is the point of contact between the terminal branches of the axons.



- Axon terminals of a neuron and the dendrites of another neuron are separated by a fine gap, i.e. a **synaptic cleft**.
- The nerve impulse is sent across the synaptic cleft with the help of the neurotransmitter acetylcholine.

Reflex Action

- Involuntary actions in response to external or internal stimuli are termed as **reflex actions**.
- The peripheral nervous system and spinal cord are involved in controlling reflex actions.
- The path travelled by the impulse during a reflex action is called a reflex arc.
- A reflex arc can be represented as follows:

Stimulus → Receptor in the sense organ → Afferent (sensory) nerve fibre → CNS (spinal cord)
→ Efferent (motor) nerve fibre → Muscle/Gland → Response

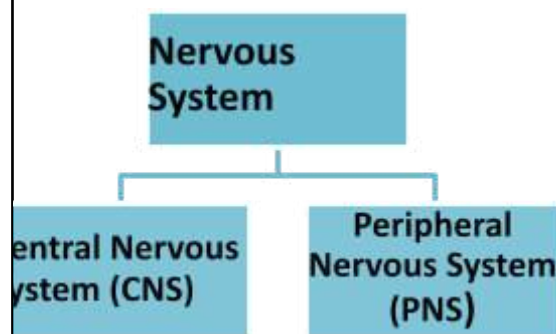
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Examples of Reflex Arc

- When you touch a hot object, you withdraw your hand from it immediately.
- Shivering when it is too cold or sweating when it is too hot.
- Dilation of the pupils of the eye to look in the dark and *vice versa*.
- When you smell your favorite dish, your mouth waters.

Divisions of the Nervous System

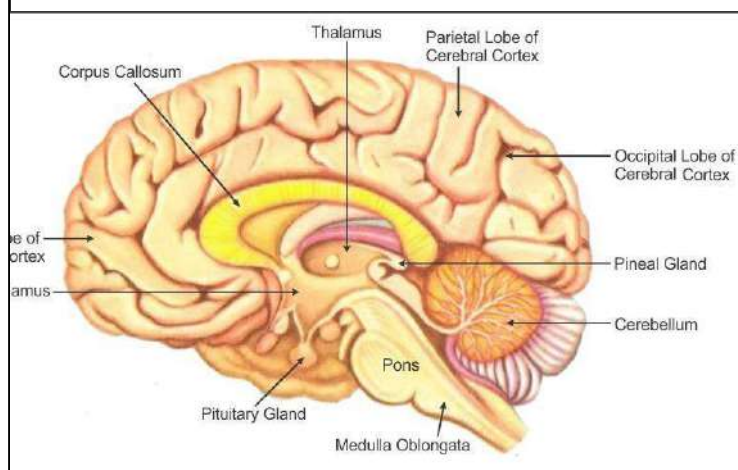


The Central Nervous System

The central nervous system includes the brain and the spinal cord.

A. The Brain

- The human brain is the largest among all animals.



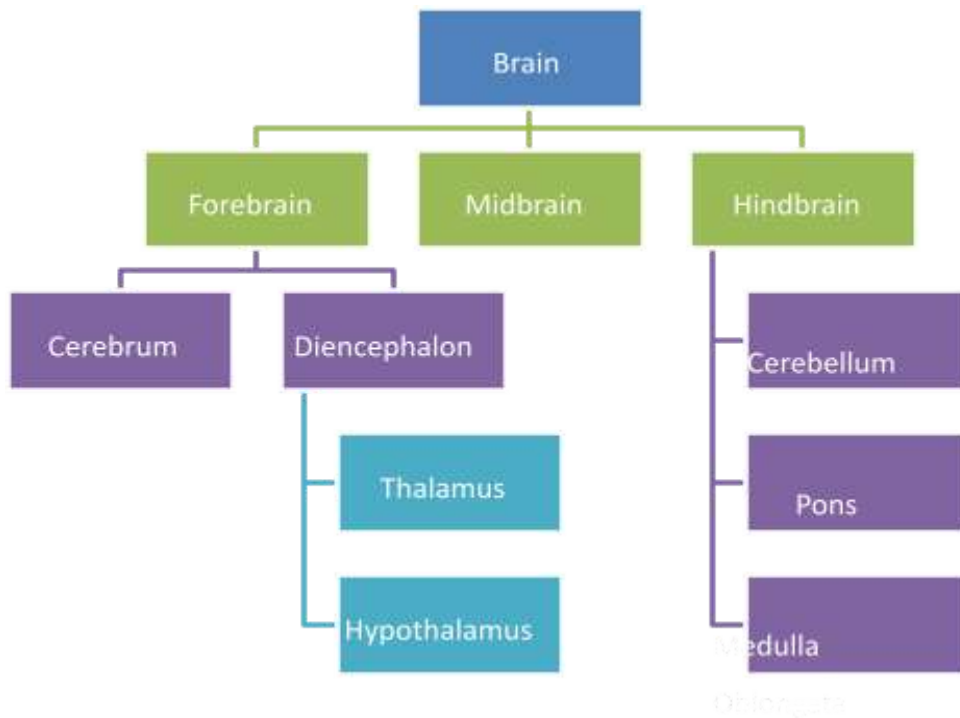
- It is well protected by the cranium or the skull.
- Three membranous coverings called meninges cover the brain.
- Inflammation of the meninges is called meningitis.
- The space between the covering membranes, central spaces of the brain and

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the central canal of the spinal cord is filled with **cerebrospinal fluid**.

- Three primary regions of the brain are forebrain, midbrain, and hindbrain.



Parts of the Brain

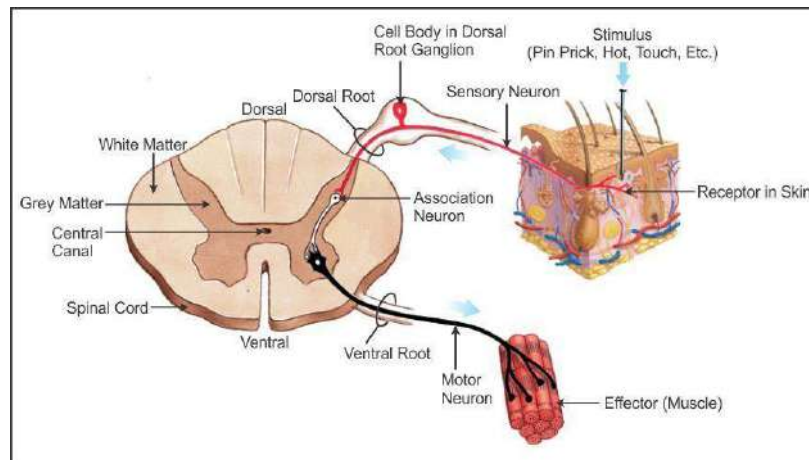
1. Cerebrum	<ul style="list-style-type: none"> • It is divided into two cerebral hemispheres connected to each other by the corpus callosum. • The walls have an outer cortex and inner medulla. • The cortex contains cell bodies of the neuron and is greyish in colour; hence grey matter. • The medulla consists of axons of the nerve fibres and is called white matter.
2. Cerebellum	<ul style="list-style-type: none"> • It is located at the base of the cerebrum. • It has numerous furrows.
3. Medulla Oblongata	<ul style="list-style-type: none"> • It is located at the base of the skull. • It is roughly triangular. • It continues behind the brain as the spinal cord. • Injury to the medulla oblongata results in death.

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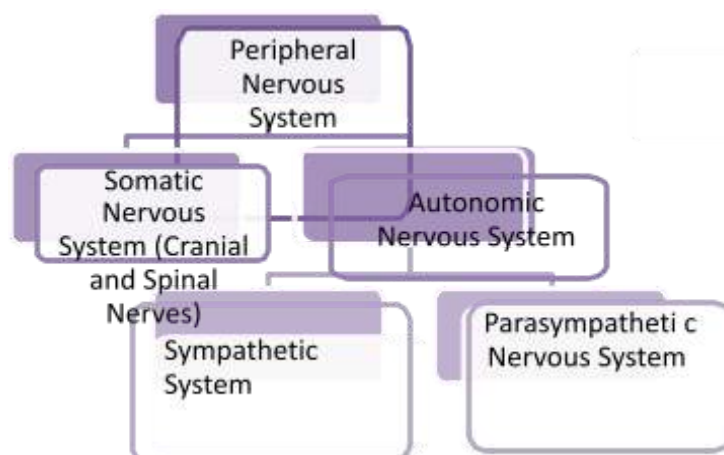
B. The Spinal Cord

- Extends from the medulla oblongata down to almost the whole length of the backbone and ends at the second lumbar vertebra.
- The grey matter is on the inner side and white matter is on the outer side of the spinal cord.
- The spinal cord is responsible for reflexes below the neck.
- It conducts sensory impulses from the skin and muscles to the brain.
- It conducts motor responses from the brain to muscles of the trunk and limbs.



Peripheral Nervous System

- The Peripheral Nervous System consists of nerves which carry impulses to and from the central nervous system.



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- The Somatic Nervous System is made up of 12 pairs of cranial nerves and 31 pairs of spinal nerves.
- Cranial nerves emerge from the brain and spinal nerves originate from the dorsal and ventral roots of the spinal cord.
- **Coordination in Plants**

Nastic Movements

- The movement of a plant in response to an external stimulus, in which the direction of response is not determined by the direction of stimulus, is called **nastic movement**.
- Nastic movements are shown by flat parts of the plants such as leaves and petals.
- Example-

Daisy flowers close at dusk and open at daybreak; this may be referred to as sleep movements.

This response however should not be confused with thigmotropism as the folding of leaves always occurs in the same direction irrespective of the direction of the stimulus.

- Two types of nastic movements are:

A. Photo nasty is a nastic movement to the light and dark phases of the day.

Example- Flowers of primrose blossom during the evening but close during the day.

B. Nyctinasty is the movement in response to dark. Certain parts of a plant such as the leaves and flowers take up a different posture at night than that in the day.

Example- Leaves of the rain tree fold by nightfall.

Movement Due to Growth

The movement of plant organs towards or away from a stimulus is known as **tropism**.

Since the tropic movements are slow, the stimulus needs to be continued for a longer time for the effects to be noticed.

The different types of tropic movements in plants are:

1. Phototropism

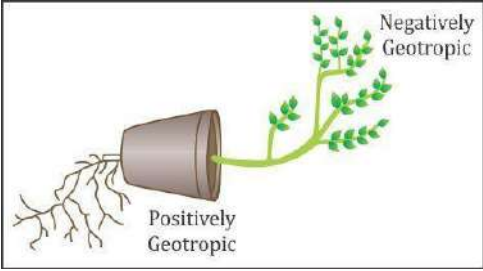


- The movement of plant parts towards or away from light is phototropism.



- Because shoots of most plants grow towards the source of light, they exhibit positive phototropism.
- Roots grow away from light and hence are negatively phototropic.

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<p>2. Geotropism</p>	<ul style="list-style-type: none"> The movement of plant organs in response to gravity is termed geotropism.  <ul style="list-style-type: none"> Roots are positively geotropic because they grow in the direction of gravity. The shoot grows upwards, i.e. against gravity, and hence is negatively geotropic. 				
<p>3. Hydrotropism</p>	<ul style="list-style-type: none"> The movement of plant organs in response to water is termed hydrotropism.  <ul style="list-style-type: none"> Roots grow towards the source of moisture and hence are positively hydrotropic. 				
<p>4. Chemotropism</p>	<ul style="list-style-type: none"> The movement of plant organs in response to a chemical stimulus is called chemotropism.  <ul style="list-style-type: none"> When plant organs grow away from the chemical response it is called negative chemotropism. When plant parts grow towards the chemical response it is called positive chemotropism. For example, pollen tubes grow towards the sugary substance in the flower. 				
<p>Plant Hormones (Phytohormones)</p>					
<p>Plant hormones control some aspects of the growth of plants such as cell division, cell enlargement and cell differentiation.</p>					
<table border="1"> <thead> <tr> <th data-bbox="331 1865 710 1899">Phytohormones</th> <th data-bbox="710 1865 1433 1899">Description</th> </tr> </thead> <tbody> <tr> <td data-bbox="331 1899 710 2065">1. Auxins</td> <td data-bbox="710 1899 1433 2065"> <ul style="list-style-type: none"> Promote growth of plants. They are secreted by the cells present in the tip of stems and roots. Synthetic auxins are used in horticulture. </td> </tr> </tbody> </table>	Phytohormones	Description	1. Auxins	<ul style="list-style-type: none"> Promote growth of plants. They are secreted by the cells present in the tip of stems and roots. Synthetic auxins are used in horticulture. 	
Phytohormones	Description				
1. Auxins	<ul style="list-style-type: none"> Promote growth of plants. They are secreted by the cells present in the tip of stems and roots. Synthetic auxins are used in horticulture. 				

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2. Gibberellins	<ul style="list-style-type: none"> ● Promote cell differentiation in the presence of auxins. ● They break seed dormancy. ● Stimulate elongation of shoots. 	
3. Cytokinins	<ul style="list-style-type: none"> ● Promote cell division in plants. ● Delay ageing of leaves. ● Promote opening of stomata. ● Promote fruit growth. 	
4. Abscisic Acid	<ul style="list-style-type: none"> ● Acts as a growth inhibitor. ● It promotes dormancy in seeds and buds. ● Promotes closing of stomata. ● Promotes wilting and falling of leaves. ● Detachment of flowers and fruits from the plants is due abscisic acid. 	
<p>Hormones in Animals</p>		
Hormones	Functions	Disorders
1. Adrenaline Produced by the adrenal glands.	<ul style="list-style-type: none"> ● Adrenaline prepares the body for the fight and flight mechanism. 	
2. Thyroxine Secreted by the thyroid gland.	<ul style="list-style-type: none"> ● Regulates carbohydrate, protein and fat metabolism. ● It increases the basal metabolic rate (BMR). ● It regulates body growth such as ossification of bones and mental development. 	<ul style="list-style-type: none"> ● Simple goitre ● Ophthalmic Goitre ● Cretinism
3. Growth Hormone Secreted by the anterior lobe of the pituitary gland.	<ul style="list-style-type: none"> ● It is essential for normal growth. 	<ul style="list-style-type: none"> ● Dwarfism ● Gigantism

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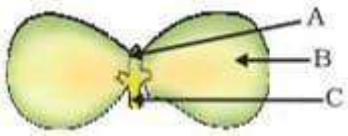
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	<p>4. Insulin Secreted by pancreas</p>	<ul style="list-style-type: none"> Regulates the blood glucose (sugar) level. 	<ul style="list-style-type: none"> Diabetes Mellitus High concentration of sugar in blood (hyperglycemia).
	<p>5. Testosterone Secreted by the testes in males.</p>	<ul style="list-style-type: none"> Controls the development of sex organs in males. Controls the development of secondary sexual characters during puberty. 	
	<p>6. Oestrogen Secreted by the ovaries in females.</p>	<ul style="list-style-type: none"> Controls the development of female sex organs. Controls the development of secondary sexual characters during puberty in females. 	
<p>Feedback Mechanism</p> <ul style="list-style-type: none"> The body has mechanisms to maintain its normal state. Whenever there is a change in the normal state, messages are sent to increase secretions if there is a fall below the normal levels or to decrease secretions if there is a rise above the normal levels to restore the normal body state. Such a mechanism is called Negative Feedback Mechanism. Example- Blood sugar level <p>The increase in blood sugar level stimulates the secretion of insulin so that the sugar level is maintained. If there is a fall in the blood sugar level below normal, it stimulates the secretion of glucagon. Glucagon stimulates the breakdown of glycogen to glucose, and thus the normal sugar level is maintained.</p>			
2			
3			

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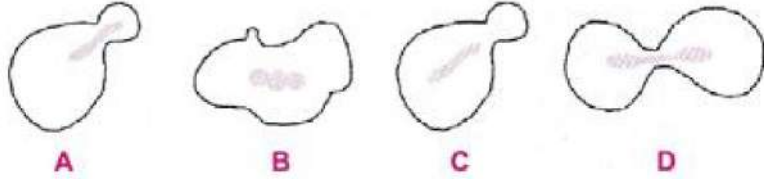
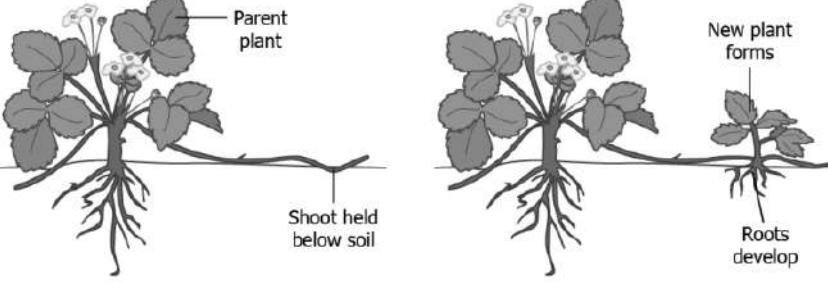
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Q NO.	QUESTION	MARK	
	SECTION -A: MCQ (QN NO 1-10)		
1	In a flower, the parts that contain male and female gametes (germ cells) are (a) stamen and anther (b) filament and stigma (c) stamen and style (d) anther and ovary	1	
Ans	(d) anther and ovary		
2	A feature of reproduction that is common to Amoeba, Spirogyra and Yeast are that (a) They reproduce asexually. (b) They are all unicellular. (c) They reproduce only sexually. (d) They are all multicellular.	1	
Ans	a) They reproduce asexually.		
3	Which among the following diseases is not sexually transmitted? (a) Syphilis (b) Hepatitis (c) HIV-AIDS (d) Gonorrhoea	1	
Ans	(b) Hepatitis		
4	The ability of a cell to divide into several cells during reproduction in Plasmodium is called (a) budding (b) multiple fission (c) binary fission (d) reduction division	1	
Ans	b) Multiple fission		
5	In the below figure parts A, B, and C are sequentially:  (a) Cotyledon, Plumule, and Radicle (b) Plumule, Radicle, and Cotyledon (c) Plumule, Cotyledon, and Radicle (d) Radicle, Cotyledon, and Plumule	1	
Ans	Option (c)		
6	The table lists some changes that occur inside the female body after fertilization of egg with sperm. <table border="1" data-bbox="336 1675 683 1906"> <tr> <td> A. Rhythmic contractions of uterus muscle for child birth. B. Formation of placenta. C. Implantation of embryo. D. Development of organs in foetus. E. Cell division of zygote. </td> </tr> </table> Which option correctly sequences these events? (a) C→B→E→A→D (b) E→C→D→B→A (c) E→C→B→D→A (d) C→E→A→B→D	A. Rhythmic contractions of uterus muscle for child birth. B. Formation of placenta. C. Implantation of embryo. D. Development of organs in foetus. E. Cell division of zygote.	1
A. Rhythmic contractions of uterus muscle for child birth. B. Formation of placenta. C. Implantation of embryo. D. Development of organs in foetus. E. Cell division of zygote.			
Ans	(c) E→C→B→D→A		

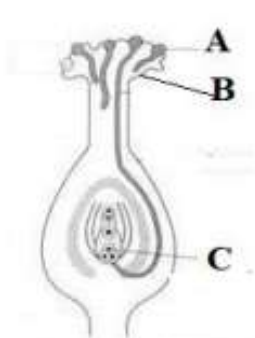
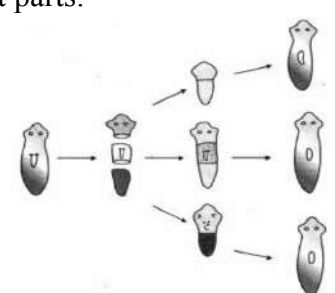
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7	<p>Out of the following diagrams which one depicts a stage in binary fission of Amoeba?</p>  <p>(a) A (b) B (c) C (d) D</p>	1
Ans	(d) D	
8	<p>Which of the following is not a part of male reproductive system in human beings? (a) Testes (b) Uterus (c) Vas deferens (d) Seminal vesicle</p>	1
Ans	(b) Uterus	
9	<p>The image shows the process of vegetative propagation in a plant.</p>  <p>The shoot of the parent plant is pushed below the soil that results in growth of a new plant. What is the advantage of this process? (a) this results in plant of different flowers (b) this helps grow plants without adding extra manure (c) this eliminates the need of producing plant using seeds (d) this allows growth of plants with new genetic composition</p>	1
Ans	(c) this eliminates the need of producing plant using seeds	
10	<p>Site of fertilisation in mammals is (a) Ovary (b) Uterus (c) Vagina (d) Fallopian tube</p>	1
Ans	(d) Fallopian tube	
ASSERTION REASONING QUESTIONS: (QN NO 11-12)		
	<p>Assertion: (A). Reason: (R) CHOOSE THE CORRECT OPTION AS PER THE STATEMENTS GIVEN IN ASSERTION AND REASON: a) Assertion and Reason both are correct and R is the correct explanation of A. b) Assertion and Reason both are correct but R is not the correct explanation of A. c) Assertion is true but Reason is false. d) Assertion and Reason both are incorrect.</p>	
11	Assertion: Scrotum is present outside the abdominal cavity.	1

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	Reason: It stores sperms which require a lower temperature than the normal body temperature	
Ans	a) Assertion and Reason both are correct and R is the correct explanation of A.	
12	Assertion (A): Off-springs produced by sexual reproduction show variation. Reason (R): Each offspring produced by sexual reproduction inherits all the genes from each parent.	1
Ans	c) Assertion is true but Reason is false	
	SECTION -B: PICTORIAL, KNOWLEDGE AND UNDERSTANDING (QN NO 13-17)	
13	Observe the given figure and answer the following questions-  <p>A. Name the part marked A in the diagram. B. How does A reach part B? C. What happens to the part marked C after fertilization is over</p>	2
Ans	Ans-A-Pollen grains, B-Stigma, C- Ovule	
14	Define Regeneration and also Draw labelled diagram of Regeneration in Planaria.	2
Ans	Regeneration is growth of injured parts of the individuals for repair and replacement of lost parts.  <p style="text-align: center;">REGENERATION IN PLANARIA</p>	
15	What is reproduction? Explain two advantages of sexual reproduction over asexual reproduction.	2
Ans	Reproduction: It is a biological process by which new individuals of the same species are produced by the existing organisms. Advantages of sexual reproduction: (i) Leads to stability of population of species. 1 (ii) Results in variations useful for the survival of the species over time	

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16	Suggest any two reasons why child marriages are a hazard to the reproductive health of women.	2
Ans	Females will not have reached full sexual maturity at the time of marriage. - There are possibilities of pregnancy in the teenage years that may cause adverse effects on the female's body. (Accept any other valid answer)	
17	Rajesh observed a patch of greenish black powdery mass on a stale piece of bread. (a) Name the organism responsible for this and its specific mode of asexual reproduction. (b) Name its vegetative and reproductive parts	2
Ans	The greenish black powdery mass on a stale piece of bread is due to bread mould (Rhizopus) which reproduces by spore formation. (b) Hyphae or thread like structures are the vegetative part and tiny blob like structures or sporangia are the reproductive parts.	
	SECTION -C : APPLICATION,EVALUATE,KNOWLEDGE AND ANALYSIS:(Q NO: 18-22)	
18	What is vegetative propagation? State two advantages and two disadvantages of this method	3
Ans	Vegetative propagation is a mode of asexual reproduction in which new plants are formed from roots, stems, leaves and buds of the individual vegetative parts of the plants. e.g. eyes of potato Advantages: (i) Offsprings are genetically identical and therefore useful traits can be preserved. (ii) It is a rapid and economical method. Disadvantages: (i) New characters cannot be introduced. (ii) The disease of the parent plant gets transferred to the offsprings	
19	(a) Define pollination. Why is it necessary for reproduction in flower bearing plants? (b) Write one reason to explain why cross pollination is preferred over self -pollination?	3
Ans	(a) Pollination is the transfer of pollen grains from anther to the stigma. It is essential because the male gametes of flower bearing plants are nonmotile. On stigma a pollen grain germinates and sends male gametes to embryo sac by means of a pollen tube. (b) Cross pollination produces variations and maintains vigour of the plants.	
20	State the changes that take place in the uterus when: (i)Implantation of embryo has occurred. (ii) Female gamete/egg is not fertilised.	3
Ans	(a) When implantation of embryo has occurred, the uterine wall thickens and is richly supplied with blood to nourish the growing embryo. (b) The thick and spongy lining of the uterus slowly breaks and comes out through the vagina as blood and mucus.	
21	Write one difference between asexual and sexual modes of reproduction. Which species is likely to have better chances of survival, the one	3

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	reproducing asexually or the one reproducing sexually? Justify your answer	
Ans	<p>(a) Difference: Asexual reproduction is mono parental, with no gametes, no meiosis and very little variations. Sexual reproduction is generally biparental involving fusion of gametes, meiosis and lot of variations.</p> <p>(b) Better Chances of Survival. Sexually reproducing. Reason: 1. Due to reshuffling of chromosomes and crossing over, sexual reproduction produces variations in almost all characters, 2. Sexual reproduction maintains as well as improves vigour and vitality of the individuals, 3. Variability and vitality are helpful to organisms in better adaptability to environment</p>	
22	<p>i) Describe the process of seed formation in a flowering plant. ii) What is the fate of the ovules and the ovary in a flower after fertilization? iii) How is the process of pollination different from fertilization?</p>	3
Ans	<p>i) The pollen from the stamen is transferred to the stigma. - The pollen tube germinates and penetrates the style to reach the ovary. - The male germ cell and the female germ cells combine to form the zygote. - The zygote undergoes rapid division to form the embryo inside the ovule. - The ovule develops a seed coat and turns into a seed</p> <p>ii) After fertilization, ovules become seeds and ovary forms the fruit.</p> <p>(iii) Pollination is the transfer of pollen grains from anther to the stigma of a flower. Fertilization is the fusion of male and female gametes</p>	
SECTION -D: CASE BASED QUESTIONS: (Q NO: 23- 24)		
23	<p>A newly married couple does not want have children for few years. They consulted a doctor who advised them barrier method and chemical method of birth control. Yet another couple who already have two children and are middle aged also consulted doctor for some permanent solution to avoid unwanted pregnancy. Doctor advised them surgical method of birth control.</p> <p>(i) What are the barrier methods of birth control? (a) Condom (b) Diaphragm (c) Oral pills (d) Both (a) and (b)</p> <p>(ii) How physical barrier prevent pregnancy? (a) They kill the sperms (b) They kill the ovum (c) They prevent sperms from meeting the ovum (d) They prevent intercourse</p> <p>(iii) How chemical methods prevent pregnancy? (a) Vaginal pills contain chemical called spermicides which kill the sperms (b) Oral pills prevent ovulation so there will be no fertilisation</p>	4

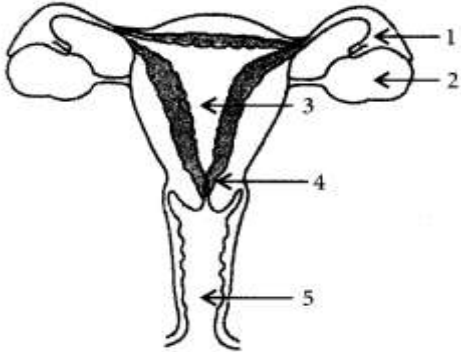
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	<p>(c) Oral pills stop menstruation in females (d) Both (a) and (b)</p> <p>(iv) Select the correct statement regarding surgical method of birth control.</p> <p>(a) It involves termination of pregnancies in women particularly after eight weeks of conception (b) Small portion of sperm duct or vas deferense in males is removed by surgical operation and both cut ends are ligated properly (c) Small portion of oviducts in females is removed by surgical operation and cut ends are ligated (d) Both (b) and (c)</p> <p style="text-align: center;">OR</p> <p>(v) Select the correct statement regarding birth control methods.</p> <p>(a) Barrier method of birth control also protects the couple from sexually transmitted diseases (b) Some women experience unpleasant side effects on taking oral pills because of change in hormonal balance in body (c) Surgical method in males is called vasectomy and in females is called tubectomy (d) All of these</p>	
Ans	<p>i)(d) Both (a) and (b) ii)(c) They prevent sperms from meeting the ovum iii)(d) Both (a) and (b) iv) (d) Both (b) and (c) v) (d) All of these</p>	
24	<p>When a girl is born, the ovaries already contain thousands of immature eggs. On reaching puberty, some of these starts maturing. One egg is produced every month by one of the ovaries. The egg is carried from the ovary to the womb through a thin oviduct or fallopian tube. The two oviducts unite into an elastic bag-like structure known as the uterus. The uterus opens into the vagina through the cervix.</p> <p>I) What is fertilization? II) Where does fertilization occur? III) What happens when egg is not fertilized? IV) What is placenta?</p>	4
Ans	<p>I The action or process of fertilizing an egg or a female animal or plant, involving the fusion of male and female gametes to form a zygote.</p> <p>II Fallopian tube</p> <p>III When an egg is not fertilized, it will disintegrate and be absorbed by the body. The uterus lining that was built up in preparation for a</p>	

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	<p>fertilized egg will also break down and be expelled from the body through the vagina. This process is called menstruation</p> <p>IV A flattened circular organ in the uterus of pregnant eutherian mammals, nourishing and maintaining the foetus through the umbilical cord</p>	
	SECTION – E: LONG ANSWER QUESTIONS:(Q NO: 25, 26)	
25	Write the function of placenta in human females, (b) List four ways of preventing pregnancy. State two advantages of using such preventive methods	5
Ans	<p>(a) Placenta: It is a special double layered, spongy tissue connection between the foetus and uterine wall found in pregnant females. It has finger-like outgrowths or villi which are in contact with blood sinuses present in the uterine wall.</p> <p>Role:</p> <ol style="list-style-type: none"> 1. Attachment: Placenta attaches the foetus to uterine wall. 2. Villi: Placenta has finger-like outgrowths or villi which develop a large surface area for fixation and absorption. 3. Nutrients: Placenta picks up nutrients from mother's blood and passes it to the blood of the foetus. 4. Waste Products: Waste products produced by the foetus passes out through the placenta into mother's blood. 5. Gases: Foetus obtains oxygen supply from mother's blood and eliminates carbon dioxide through placenta. <p>(b) Methods of Contraception:</p> <ol style="list-style-type: none"> 1. Mechanical Barriers like condoms, cervical cap, diaphragm. 2. Oral Contraceptives or oral pills like Mala D, Saheli 3. Intrauterine Contraceptive Devices (IUCD) like loop, bow, Cu-T. 4. Surgical Methods like vasectomy in males and tubectomy in females 	
26	<p>a) Identify the given diagram. Name the parts 1 to 5.</p>  <p>b) What is contraception? List three advantages of adopting contraceptive measures</p>	

CHAPTER 7

HOW DO ORGANISMS REPRODUCE

Ans	<p>a) The given diagram is the sectional view of human female reproductive system. The labelled parts are: 1. Funnel of fallopian tube or oviduct 2. Ovary 3. Uterus or womb 4. Cervix 5. Vagina</p> <p>(b) Contraception is the avoidance of pregnancy. There are several methods of contraception such as:</p> <ul style="list-style-type: none"> ● Barrier methods (condoms, diaphragm, etc.) ● Chemical methods (spermicide creams and jellies) ● Intrauterine Contraceptive Devices (IUCDs) (Lippe loop, CuT, etc.) ● Natural methods (rhythm method, coitus interruptus) ● Surgical methods (vasectomy, tubectomy) <p>Three advantages of adopting contraceptive methods are:</p> <p style="padding-left: 40px;">They prevent frequent or unwanted pregnancies. They prevent the transfer of sexually transmitted diseases (STDs)</p> <p style="padding-left: 40px;">They help to regulate the population growth</p>
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Sl no.	Important Video link
1	https://youtu.be/y-emlY6DBH8?si=deaWrv3MqgOa7Nnd
2	https://youtu.be/19NKRHY_3kk?si=7AXYu5hD2rvsAnmt
3	https://youtube.com/shorts/iqGG9gPV2jg?si=_CFJz-CVjCFhrdXp
4	https://youtu.be/SakyW8-iu_Y?si=Ix-bKEyZ-2-u3A87

Sl no.	Short cut Tis/ concept map
1	<ul style="list-style-type: none"> ● Asexual reproduction takes place through fission, fragmentation, budding, vegetative propagation and spore formation. ● <u>Advantages of Vegetative Propagation:</u> <p>(a) Plants raised by vegetative reproduction can bear flowers and fruits earlier than those produced from seeds. (b) This process helps those plants to propagate that have lost the capacity to reproduce. (c) It is a quicker method of multiplication. (d) It helps to preserve good qualities of a variety or race indefinitely</p>
2	<p><u>Reproduction in Humans:</u></p> <ul style="list-style-type: none"> ● The formation of male germ cell (sperms) takes place in the testes. Testes are located outside the abdominal cavity in scrotum. ● Scrotum has a relatively low temperature needed for the production of sperms by testes. ● Testes release a male sex hormone called testosterone. ● The female germ cells or eggs are produced in the ovaries. ● Fertilization occurs in the fallopian tube of female genital tract.

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HOW DO ORGANISMS REPRODUCE

	<ul style="list-style-type: none">● The embryo gets nutrition from the mother's blood with the help of a special tissue called placenta.● Functions of placenta:● It provides a large surface area for glucose and oxygen to pass from the mother to the embryo.● The wastes from developing embryo are removed to mother's blood through placenta.
3	<p style="text-align: center;"><u>Methods of Contraception:</u></p> <p>(i) Barrier method: Example: Condom, diaphragm, cervical cap, vault cap and femidom etc. (ii) Chemical method: Example: Oral pills, vaginal pills, OC. (iii) Surgical method: It involves surgical removal or ligation of vas deferens in males and the fallopian tube in females.</p> <p>>STD (Sexually Transmitted Diseases): Disease caused by virus—AIDS, Genital warts and herpes. Disease caused by bacteria—Gonorrhoea, Syphilis.</p> <p><u>Prevention of STDs:</u></p> <p>(a) By using contraceptive devices. (b) By educating people and maintaining hygiene. (c) By avoiding sex with unknown/multiple partners.</p> <p><u>Sexual Reproduction in plants :</u></p> <p>Flower is the reproductive organ of Plants.</p> <p>> Flowers can be of two types: Unisexual (e.g., papaya) and bisexual (e.g., Hibiscus). > Pollination is the transfer of pollen grain from anther to stigma. It is of two types: self-pollination and cross pollination. > After pollination, a pollen tube grows out of pollen grains, through which male germ cell reaches the ovary and fuses with the female germ cell. > Fertilization is the process of fusion of male and female gamete to produce zygote. It occurs inside the ovary.</p> <p>> After fertilization:</p> <p>(i) Zygote divides several times to form an embryo within the ovule. (ii) The ovule develops a tough coat and is converted into a seed. iii)Ovary ripens to form a fruit. (iv) Sepal, petals, stamens, style and stigma may shrivel off. > The seed contains the future plant or embryo which develops into a seedling under suitable condition. This process is known as Germination.</p>

CHAPTER 7

HOW DO ORGANISMS REPRODUCE

CHAPTER 8

HEREDITY

Q. NO.	QUESTION	MARK
SECTION -A: MCQ (QN NO 1-10)		
1	Which of the following is a recessive trait a) Tallness b) Round seed coat c) Wrinkled seed coat d) Yellow seed colour	1
Ans	c) Wrinkled seed coat	
2	Who have a perfect pair of sex chromosomes? a) Girls only b) Boys only c) Both girls and boys d) It depends on many other factors	1
Ans	a) Girls Only	
3	How many pairs of autosomes are present in human beings? a)20 b)22 c)23 d)25	1
Ans	b)22	
4	A zygote in which Y chromosome is inherited from the father will develop into a) boy b) girl c) either boy or girl d)cannot be determined from above information	1
Ans	a) boy	
5	Name the animal in which sex is not genetically determined a)Fruit fly b)Birds c)Human being d)Turtle	1
Ans	d)Turtle	
6	In peas, a pure tall plant (TT) is crossed with a pure short plant (tt). The ratio of pure tall plants to pure short plants in F ₂ generation will be: a) 1:3 b) 3:1 c) 1:1 d) 2:1	1
Ans	b)3:1	
7	Which is the characteristic of the parents that can be inherited by their children? a) Deep scar on chin b) Cut nose c) Technique of swimming d) Snub nose	1

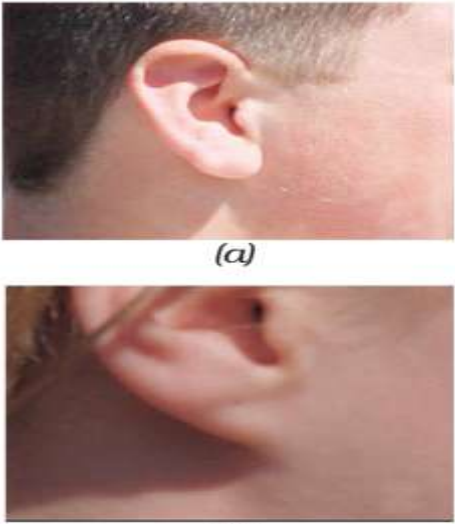
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Ans	d) Snub nose	
8	A trait in an organism is influenced by: a) Paternal DNA only b) Both maternal and paternal DNA c) Maternal DNA only d) Neither by paternal nor by maternal DNA	1
Ans	a) Both maternal and paternal DNA	
9	In human beings, the genotype for black hair is B and the phenotype for brown hair is b. What is the hair colour of the person having genotype Bb a) Black b) Brown c) Auburn d) None of the above	1
Ans	a) Black	
10	Which of the following ratio is true for “Law of Segregation” as proposed by G. Mendel? a)1:2:1 b)1:3:1 c)9:3:3:1 d) 1:4:1	1
Ans	a)1:2:1	
ASSERTION REASONING QUESTIONS: (QN NO 11-12)		
<p>Assertion: (A). Reason: (R) CHOOSE THE CORRECT OPTION AS PER THE STATEMENTS GIVEN IN ASSERTION AND REASON: a) Assertion and Reason both are correct and R is the correct explanation of A. b) Assertion and Reason both are correct but R is not the correct explanation of A. c) Assertion is true but Reason is false. d) Assertion and Reason both are incorrect.</p>		
11	Assertion: In monohybrid cross, F1 hybrid expresses dominant character Reason: Dominance is expressed only in heterozygous condition	1
Ans	c) Assertion is true but Reason is false. Dominance is expressed both in heterozygous and homozygous conditions	
12	A: Monohybrid cross deals with inheritance of one pair of contrasting characters. R: Dihybrid cross deals with inheritance of two pairs of contrasting characters	1
Ans	b) Assertion and Reason both are correct but R is not the correct explanation of A.	
SECTION -B: PICTORIAL, KNOWLEDGE AND UNDERSTANDING (QN NO 13-17)		

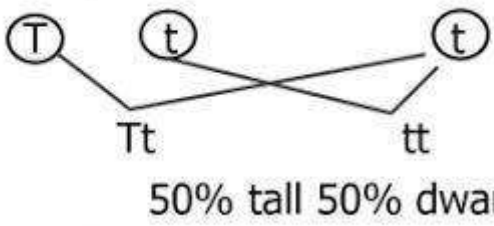
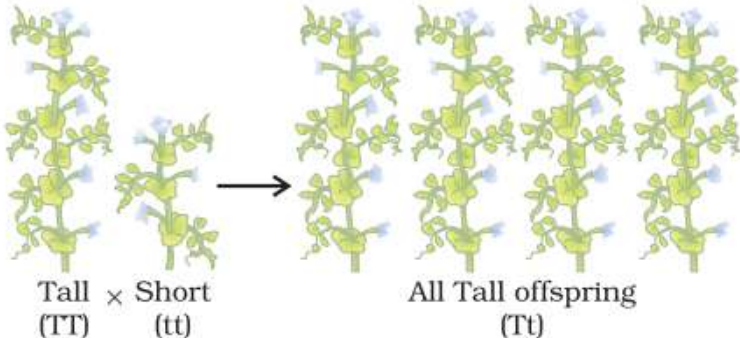
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13	 <p>(a)</p> <p>(b)</p> <p>a) Name the above traits in human beings b) Is the trait inherited or acquired? Give reasons for your answer.</p>	2
Ans	<p>a) Free earlobe and attached earlobe</p> <p>b) It is an inherited trait and is passed onto children from their parents. Free ear lobe is dominant over attached ear lobe. Acquired traits cannot be passed to future offspring</p>	
14	Why did Mendel select Pea plant? (State any two points)	2
Ans	<p>a) Short life span b) Presence of many pairs of observable contrasting traits</p>	
15	What is the law of dominance of traits?	2
Ans	Law of dominance of traits: In a cross between a pair of contrasting characters, only one parental character will be expressed in F ₁ generation which is called dominant trait and the other is called recessive trait.	
16	<p>Give the pair of contrasting traits of the following characters in pea plant and mention which is dominant and recessive:</p> <p>i) Yellow seed ii) Round seed</p>	2
Ans	<p>Colour of Seed Yellow - Dominant Green - Recessive Shape of Seed Round - Dominant Wrinkled - Recessive</p>	

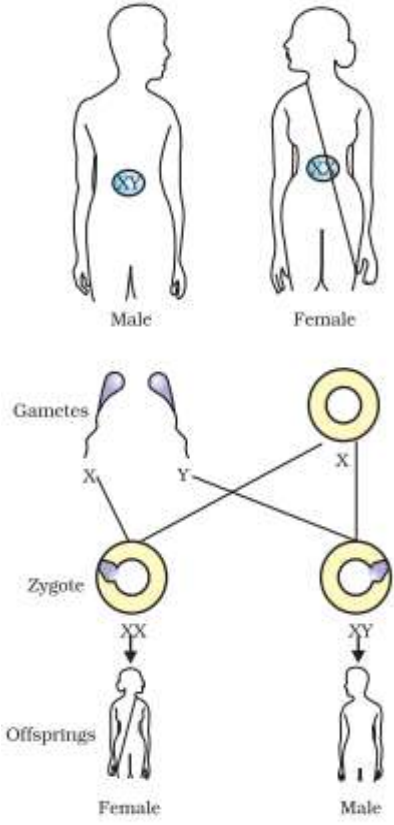
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17	<p style="text-align: center;"> Tt (Tall) x tt (dwarf) </p>  <p style="text-align: center;">50% tall 50% dwarf</p>	2
Ans	<p>Test cross is represented by the above diagram. What is its utility?</p> <p>Test cross was developed by Gregor J Mendel to find out whether a plant with dominant phenotype is Pure or Hybrid</p>	
18	<p>Differentiate between:</p> <p>a) Gamete and Zygote</p> <p>b) Heredity and variations</p>	2
	<p>a) Gamete is haploid (i.e. having a single set of chromosome) whereas zygote is diploid (i.e. having a two sets of chromosome)</p> <p>b) Heredity is the inheritance of characters from parents to offspring whereas variations are the differences existing among individuals of a species</p>	
	<p>SECTION -C : APPLICATION,EVALUATE,KNOWLEDGE AND ANALYSIS:(Q NO: 19-23)</p>	
19	<p>“A trait may be inherited but not expressed.” Explain with the help of an example</p>	3
Ans	 <p style="text-align: center;"> TT × tt → All Tall offspring (Tt) </p> <p>In the above diagram, the F1 offspring have inherited the dwarf gene from the parent but it is not expressed in the F1 generation as it is a recessive trait</p>	
20	<p>A pure green stemmed tomato was allowed to undergo monohybrid cross with a purple stemmed tomato.</p> <p>a) What is the colour of the stem in the F1 progeny?</p> <p>b) What is the percentage of the green stemmed tomato in the F1 generation?</p> <p>c) What is the phenotypic and genotypic ratio in F2 generation?</p>	3
Ans	<p>a) Green stem</p> <p>b) 100%</p> <p>c) Phenotypic ratio: 3:1</p>	

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	d) Genotypic ratio: 1:2:1	
21	“It is a matter of chance whether a new-born will be a boy or a girl and none of the parents are responsible for it.” Justify this statement with the help of suitable chart	3
Ans	 <p>As the above diagram shows, half the children will be boys and half will be girls. All children will inherit an X chromosome from their mother regardless of whether they are boys or girls. Thus, the sex of the children will be determined by what they inherit from their father. A child who inherits an X chromosome from her father will be a girl, and one who inherits a Y chromosome from him will be a boy. Hence, there is 50% chance of male child and 50% chance of a female child. Moreover, the male releases hundreds of millions of sperms at a time and so none of the parent can actively control the fertilization event</p>	
22	If in a species of Amoeba, a trait A exists in 10% of the population and a trait B exists in 50% of the same population, then which of the trait is likely to have arisen later? Justify your answer	3
Ans	Trait A is said to have arisen later as variations do not occur in asexually reproducing species like amoeba. Variations may have arisen due to mutations. Trait B in 50% population shows that the trait has been replicated for a longer period of time as compared to trait A	
23	How is the equal genetic contribution of male and female parents ensured in the progeny?	3
Ans	Male individual has 46 chromosomes but because the gametes are always haploid i.e. they have half the number of chromosomes; sperm will be haploid (23 chromosomes). Female individual also contains only 23 chromosomes in egg. It is the fusion of the sperm and egg which leads to an off-springs with 46 chromosomes	

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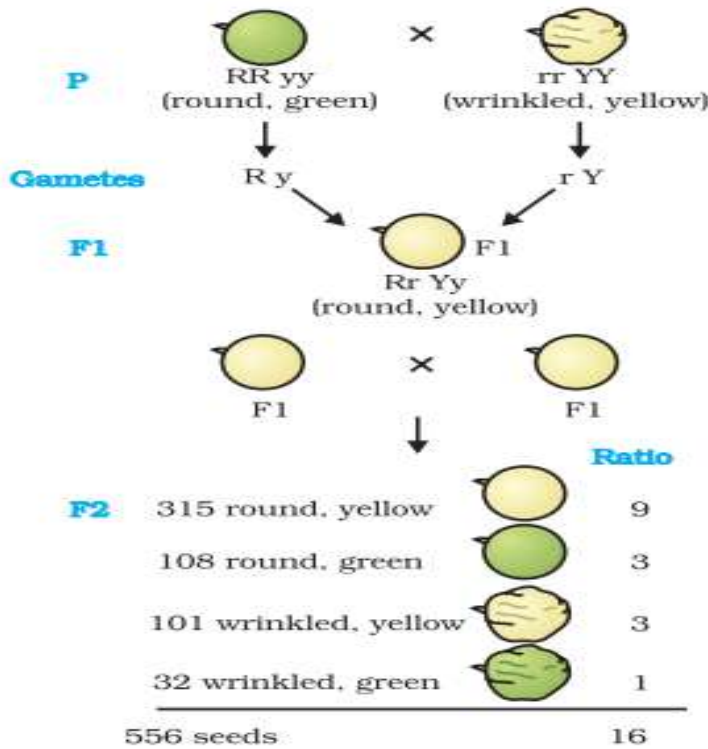
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SECTION -D: CASE BASED QUESTIONS: (Q NO: 23- 24)

24

Refer to the given table regarding results of Mendel’s Dihybrid cross with pea plant

4



- From the above data, find out the percentage of round and yellow seeds among F2 offspring?
- Why do you think the wrinkled and green seeds are least in number?
- What will happen if RRyy is crossed with rrYY?

Ans

- $315/556=56.6\%$
- Both Wrinkled seed coat and green seed colour are recessive traits and hence these are expressed in least number of times
-

Gametes	rY
Ry	RrYy (Round and Yellow)

25

A student has crossed a pea plants with white flowers with another pea plant with violet flowers. He found out that all the flowers in the F1 generation are white. When the F1 plants were self-pollinated, a total of 1200 offspring were produced.

4

- What is the genotype of the F1 offspring?
- Give reasons why all the F1 offspring were having white flowers?

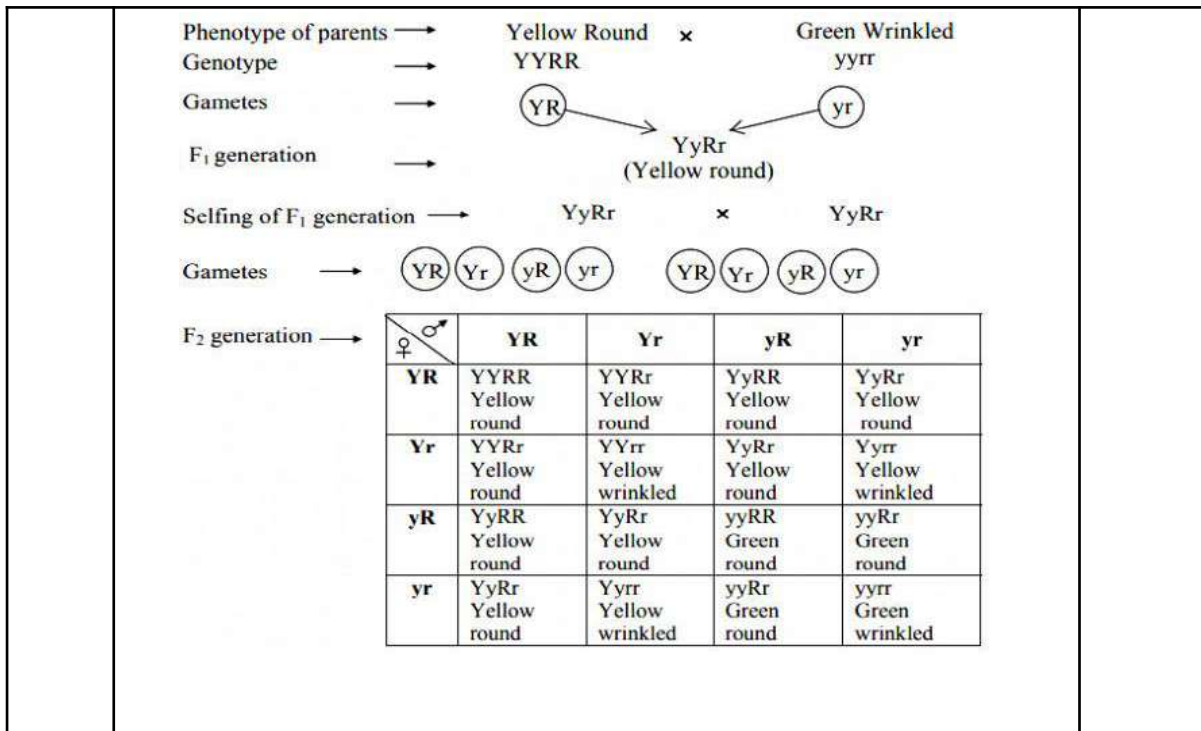
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	c) Find out the number of hybrids and pure plants in F ₂ generation? d) Find out the number of pure plants with white flowers and violet flowers separately in F ₂ generation?	
Ans	a) WW b) White colour of the flower is dominant over violet colour in pea plants c) No. of hybrids = $(2 \times 1200) / 4 = 600$ No. of pure plants = $(2 \times 1200) / 4 = 600$ d) No. of pure plants with white flowers = $(1 \times 1200) / 4 = 300$ No. of pure plants with violet flowers = $(1 \times 1200) / 4 = 300$	
SECTION – E: LONG ANSWER QUESTIONS: (Q NO: 26)		
26	a) Who is known as the father of Genetics? b) State the law of segregation. c) How do Mendel's experiment show that inheritance of two traits is independent of each other?	5
Ans	a) Gregor J Mendel b) When a pair of contrasting factors are brought together in a hybrid, these do not blend but remain together and separate at the time of gamete formation such that each gamete receives only one of the pair of factors c) Mendel conducted a dihybrid cross and observed that though he started with two types of parents, he obtained four types of individuals in F ₂ generation. The appearance of new recombination in F ₂ generations along with parental type characters showed that traits are inherited independently of each other For example-	

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Sl no.	Important Video link
1	
2	
3	

Sl no.	Short cut Tis/ concept map
	<ol style="list-style-type: none"> Heredity – Transmission of characters from parents to the offspring i.e. from one generation to the next is called heredity. Variations – The differences in the traits shown by the individuals of a species, and also by the offspring (siblings) of the same parents are referred to as variations. Genetics – Genetics is the branch of science that deals with the study of heredity & variations. (the term genetics was coined by William Bateson in 1906) Genes which code for a pair of contrasting traits are known as alleles Dominant trait: The character which expresses itself in a (F₁) generation is dominant trait. Example: Tallness is a dominant character in pea plant. Recessive trait: The character which does not express itself but is present in a generation is recessive trait. Ex. dwarfism in the pea plant. Contrasting characters – the characters which always appear in two opposing conditions

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8. Homozygous: A condition in which allelic pair of genes are identical for example; an organism has both the allele for tallness it is expressed as TT and homozygous gene for dwarfness is written as tt.
9. Heterozygous: A condition in which allelic pair of genes are of different types for example; an organism has genes Tt it means it has an allele for tallness T and the other for dwarfness t and only tall character is expressed.
10. Genotype: It is genetic makeup of an individual for example; A pure tall plant is expressed as TT and hybrid tall as Tt.
11. Phenotype: It is external appearance of the organism for example; a plant having Tt composition will appear tall.

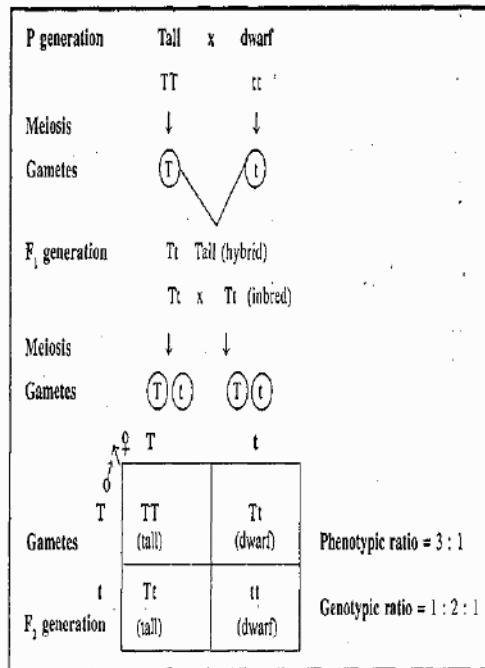
Seven Traits of <i>Pisum Sativum</i>											
The seven pairs of contrasting characters of <i>Pisum sativum</i> chosen by Mendel for his experiment :											
Characters	Dominant Traits	Recessive Traits		Stem height	Seed shape	Seed color	Flower color	Pod shape	Pod color	Flower position	
Height	Tall	Dwarf	Dominant traits								
Seed shape	Round	Wrinkled		Tall	Round	Yellow	Violet	Inflated (full)	Green	Axial	
Seed color	Yellow	Green		Recessive traits							
Flower color	Violet	White			Dwarf	Wrinkled	Green	White	Constricted (flat)	Yellow	Terminal
Pod shape	Inflated	Constricted									
Pod color	Green	Yellow									
Flower position	Axial	Terminal									

Mendel's Experiment: Mendel started his experiment on the pea plants. He conducted first monohybrid and then dihybrid crosses.

Monohybrid Cross - Cross to observe inheritance of single pair of contrasting characters

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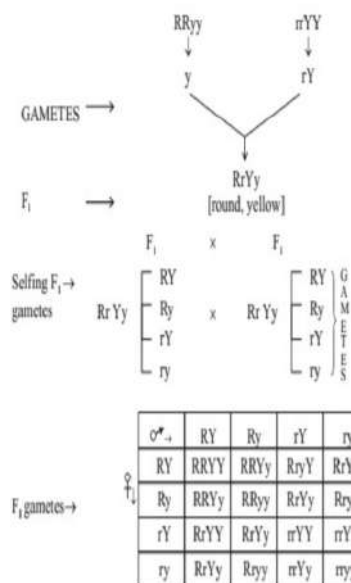
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Observations of Monohybrid Cross

1. All F₁ progeny were tall (no medium height plant (half way characteristic))
2. F₂ progeny 1/4th were short, 3/4th were tall
3. Phenotypic ratio F₂ – 3 : 1 (3 tall: 1 short) Genotypic ratio F₂ – 1 : 2 : 1

Dihybrid Cross: A cross between two plants having two pairs of contrasting characters is called dihybrid cross.



The phenotypic ratio was found to be 9:3:3:1

9 are round yellow

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3 are round green

3 are wrinkled yellow

1 is wrinkled green

But the genotypic ratio was found to be 1:2:1: 2:4:2: 1:2:1.

FACTORS

Responsible for Sex Determination

Environmental

In some animals the temperature at which the fertilised eggs are kept decides the gender.

eg. in Turtle

Genetic

In some animals like humans gender or individual is determined by a pair of chromosome called sex chromosome

XX – Female

XY – Male

Sex determination in Human beings

PARENTS :

FATHER

XY

MOTHER

XX

GAMETES
(Reproductive cells)

X

Y

X

X

Zygote
formed
after fusion
of gametes
↓
offspring

XX
FEMALE

XX
FEMALE

XY
MALE

XY
MALE

50% probability
of a female child

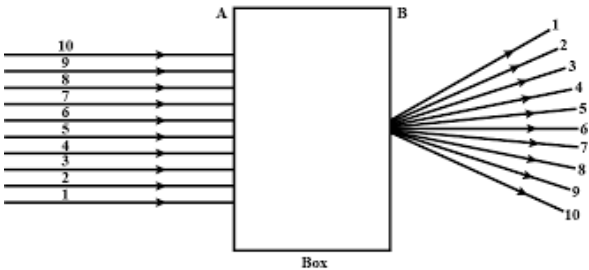
50% probability
of a male child

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CHAPTER 9

LIGHT REFLECTION AND REFRACTION

Q NO.	QUESTION	MARK
SECTION -A: MCQ (QN NO 1-10)		
1	No matter how far you stand from a mirror, your image appears erect. The mirror is likely to be- (a) Plane (b) Concave (c) Convex (d) Either plane or convex	1
Ans	(d) Either plane or convex	
2	Which one of the following materials cannot be used to make a lens? (a) Water (b) Glass (c) Plastic (d) Clay	1
Ans	(d) Clay	
3	Which type of mirror is used by ear, nose, and throat doctor (ENT) specialists as a 'head mirror'? (a) Plane mirror (b) Convex mirror (c) Concave mirror (d) None of these	1
Ans	(c) Concave mirror	
4	The properties of image formed by the plane mirror are: (i) Virtual (ii) Inverted (iii) Laterally inverted (iv) Size of the image is equal to that of the object. Choose the correct option. (a) (ii), (iii) and (iv) (b) (i), (iii) and (iv) (c) (i), (ii) and (iii) (d) (i), (ii) and (iv)	1
Ans	(b) (i), (iii) and (iv)	
5	A beam of light is incident through the holes on side A and emerges out of the holes on the other face of the box as show in the figure. Which of the following could be inside the box?  (A) Concave lens (B) Rectangular glass slab (C) Prism (D) Convex lens	1
Ans	(D) Convex lens	
6	You are given water, mustard oil, glycerine and kerosene. In which of these media a ray of light incident obliquely at same angle would bend the most? A. Kerosene B. Water C. Mustard oil D. Glycerine	1
Ans	D. Glycerine	

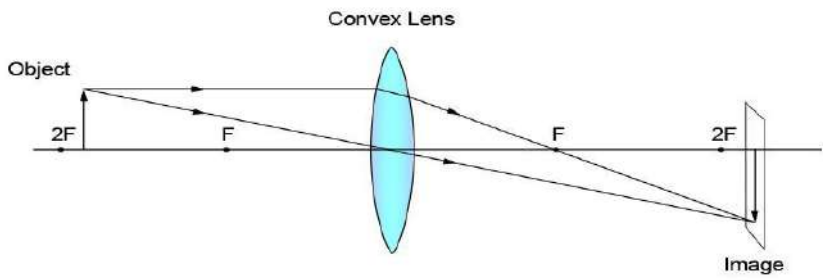
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LIGHT REFLECTION AND REFRACTION

7	The magnification of a spherical mirror is ± 3 . Then the mirror must be (a) Plane (b) Concave (c) Convex (d) Any one of these	1
Ans	b) Concave	
8	Power of the lens is -40, its focal length is a. 4m b. -40m c. -0.25m d. -25m	1
Ans	c. -0.25m	
9	The S.I unit of Power of a lens is _____. (a) cm (b) m (c) cm-1 (d) Dioptre	1
Ans	(d) Dioptre	
10	What is the unit of refractive index:- (a) Dioptre (b) Degree (c) unit less (d) m/sec	1
Ans	(c) unit less	
ASSERTION REASONING QUESTIONS: (QN NO 11-12)		
	Assertion: (A). Reason: (R) CHOOSE THE CORRECT OPTION AS PER THE STATEMENTS GIVEN IN ASSERTION AND REASON: a) Assertion and Reason both are correct and R is the correct explanation of A. b) Assertion and Reason both are correct but R is not the correct explanation of A. c) Assertion is true but Reason is false. d) Assertion and Reason both are incorrect.	
11	Assertion (A): Concave mirrors are used as make-up mirrors. Reason (R): When the face is held within the focus of a concave mirror, then a diminished image of the face is seen in the concave mirror.	1
Ans	a) Assertion and Reason both are correct and R is the correct explanation of A.	
12	Assertion(A): Light travels faster in water than air Reason (R): Water is denser than Air.	1
Ans	d) Assertion and Reason both are incorrect.	
SECTION -B: PICTORIAL, KNOWLEDGE AND UNDERSTANDING (QN NO 13-17)		
13	The value of magnification for a concave mirror is +4. What does it mean?	2
Ans	i. Image formed is virtual and erect. ii. Image is magnified 4 times. iii. Object is placed between Focus and pole thus, virtual & erect image formed. (Any two)	
14	If the angle between the incident ray and the reflected ray is 110° , what will be the angle of reflection?	2
Ans	According to law of reflection, $\angle i = \angle r$	

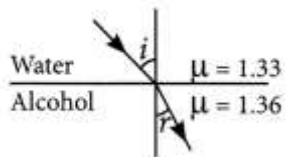
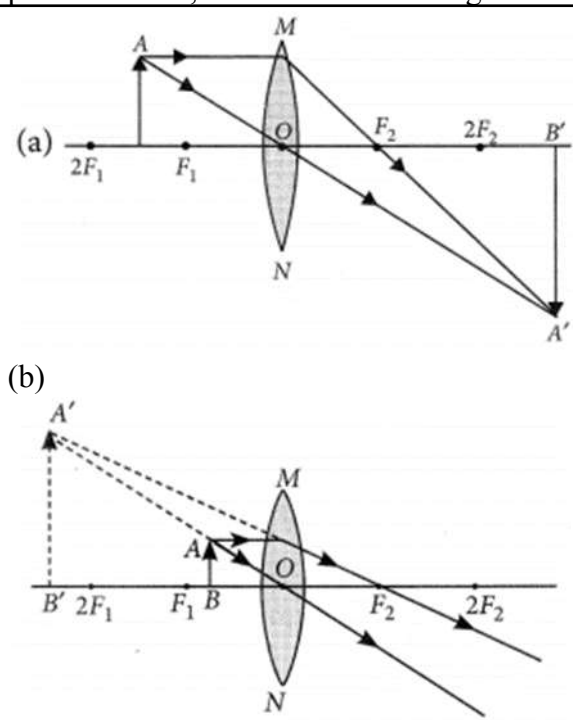
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LIGHT REFLECTION AND REFRACTION

	$\text{So, } \angle i + \angle r = 110^\circ$ $2 \angle i = 110^\circ$ $\angle i = 55^\circ$	
15	If the radius of curvature of a spherical mirror is 60 cm, what will be its focal length?	2
Ans	$R = 60 \text{ cm}$ $R = 2f$ Thus, $f = 60/2$ $f = 30 \text{ cm.}$	
16	Draw ray diagram for the image formed when object is placed between F and 2F of convex lens and also, state the nature and size of image formed.	2
Ans	 <p>Position – Beyond 2f Nature – real and erect Size - Magnified</p>	
17	‘Magnification produced by a convex mirror is always less than 1.’ Explain this statement.	2
Ans	A convex mirror always creates a virtual image which is diminished. So, magnification produced by convex mirror is always less than one.	
SECTION -C : APPLICATION, EVALUATE, KNOWLEDGE AND ANALYSIS:(Q NO: 18-22)		
18	An object of height 6 cm is placed perpendicular to the principal axis of a concave lens of focal length 5 cm. Use lens formula to determine the position, size and nature of the image if the distance of the object from the lens is 10 cm.	3
Ans	Focal length of given concave lens, $f = -5 \text{ cm}$ Distance, $u = -10 \text{ cm}$, object size, $h = 6 \text{ cm}$ Image distance, $v = ?$ Using lens formula, $1/f = 1/v - 1/u$ $1/v = 1/f + 1/u = 1/-5 + 1/-10 = -3/10$ $v = -10/u = -3.33 \text{ cm}$ So, the image is located 3.33 cm from the lens. Magnification (m) of lens is given by $m = v/u = -10/3/-10 = 1/3 = 0.33$ m is positive implies that image is virtual and erect. Also, magnitude of m is less than one implies that image is diminished. Since $m = v/u = h'/h \Rightarrow 1/3 = h'/6$ or $h' = 2 \text{ cm}$	
19	a) Water has refractive index 1.33 and alcohol has refractive index 1.36. Which of the two medium is optically denser? Give reason for your answer. (b) Draw a ray diagram to show the path of a ray of light passing	3

CHAPTER 9

LIGHT REFLECTION AND REFRACTION

	obliquely from water to alcohol. (c) State the relationship between angle of incidence and angle of refraction in the above case.	
Ans	<p>a) Here, alcohol is optically denser medium as its refractive index is higher than that of water. When we compare the two media, the one with larger refractive index is called the optically denser medium than the other as the speed of light is lower in this medium.</p> <p>(b) Since light is travelling from water (rarer medium) to alcohol (denser medium), it slows down and bends towards the normal.</p>  <p>where i = angle of incidence and r = angle of refraction.</p> <p>(c) According to Snell's law, $\sin i / \sin r = \mu_{\text{alcohol}} / \mu_{\text{water}} = 1.36 / 1.33 = 1.0225$ $\therefore \sin i = 1.0225 \times \sin r$</p>	
20	<p>The linear magnification produced by a spherical mirror is +3. Analyse this value and state the</p> <ol style="list-style-type: none"> Nature of image formed type of mirror position of the object with respect to the pole of the mirror. 	3
Ans	<ol style="list-style-type: none"> Positive value of the magnification indicates that image is virtual and erect. Since the image is magnified, the mirror is concave. The object is between pole and focus of the mirror 	
21	<p>Draw ray diagrams to show the formation of three times magnified (a) real, and (b) virtual image of an object by a converging lens. Mark the positions of O, F and 2F in each diagram.</p>	3
Ans		

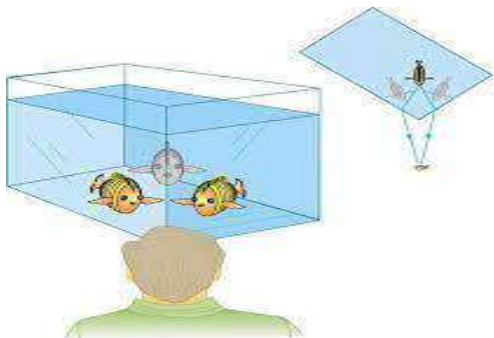
CHAPTER 9

LIGHT REFLECTION AND REFRACTION

22	A spherical mirror produces an image of magnification -1 on a screen placed at a distance of 50 cm from the mirror. (a) Write the type of mirror. (b) Find the distance of the image from the object. (c) What is the focal length of the mirror?	3
Ans	(a) Concave mirror (b) Magnification, $m = -v/u$ so, $v = u$ \therefore Distance of the image from the object is, $v - u = 0$ (c) As the image is formed at centre of curvature i.e., $v = R$. \therefore focal length of the mirror, $f = -50/2 = -25$ cm	
SECTION -D: CASE BASED QUESTIONS: (Q NO: 23- 24)		
23	An image formed in a convex mirror is always virtual, erect and smaller in size whatever be the position of the object. However in a concave mirror the image may be real or virtual, erect or inverted, smaller or bigger in size than the object. This would depend upon the distance of the object from the mirror. 1. A Concave mirror is used as reflector in A. Torches B. Search lights C. Head lights of motor vehicles D. All the above 2. In street lamps, the reflector used is a A. Convex mirror B. Concave mirror C. Plane mirror D. None of these 3. Which of the mirrors has larger field of view? A. Convex B. Concave C. plane D. all have same field of view 4. Real or virtual image of an object formed by a concave mirror depends on A. Size of mirror B. Polish of mirror C. Distance of object from the mirror D. All of these	4
Ans	1.D 2.A 3.A 4.C	
24	The image of an object formed by a convex lens may be real/virtual: erect/inverted; smaller/larger than the object. It would depend upon distance of the object from the lens. However, the image of an object formed by a concave lens is always virtual, erect and smaller in size than the object. 1. To obtain image of an object on a screen we require a A. Convex lens B. Concave lens C. Concave lens of large focal length D. Concave lens of small focal length 2. Where an object should be placed in front of a concave lens to obtain a virtual image of the object? A. Infinity B. Principal focus C. Very close to the lens D. Any distance from the lens 3. Where should an object be placed in front of a convex lens to obtain image of the size of the object? A. At focus F B. At 2 F C. Beyond 2 F D. None of these 4. To obtain an image smaller than the size of the object, we may use a	4

CHAPTER 9

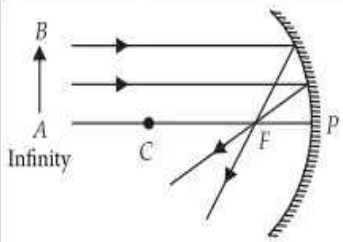
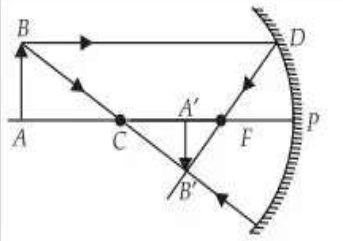
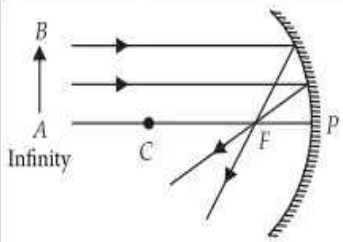
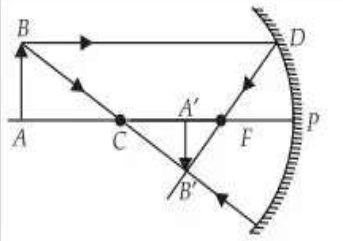
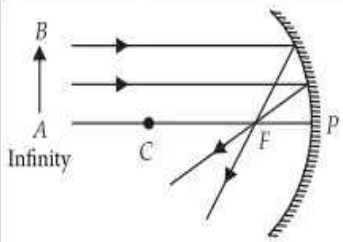
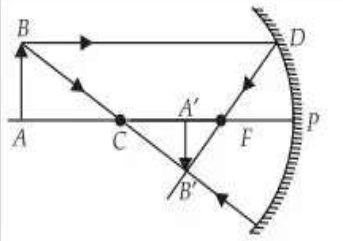
LIGHT REFLECTION AND REFRACTION

	A. Convex lens only C. Either a convex lens or a concave lens	B. Concave lens only D. Cannot say	
Ans	1.A 2.D 3.B 4.C		
SECTION – E: LONG ANSWER QUESTIONS:(Q NO: 25)			
25	<p>If you have an aquarium or fish bowl at home, you might notice the fish looks bigger when you look through the side. However, if you put your hand on the opposite side of the aquarium/bowl, it also looks bigger.</p>  <p>a. Observe the picture and give the reason. b. State Snell's law. Why refractive index has no unit? c. The formula to calculate the refractive index is (i) $n = cv$ (iii) $n = c/v$ (ii) $n = v/c$ (iv) $v = nc$ d. The focal length of convex lens is _____ and the focal length of concave lens is _____.</p>	5	
Ans	<p>a. Refraction of light as light goes from air to water and then water to air. b. The ratio of the sine of the angle of incidence to the sine of the angle of refraction is constant for the pair of the given media. Because the refractive index of a medium represents the ratio of the speed of light in a vacuum of light speed of the same light within the medium, and ratios do not have any unit. c. (iii) $n = c/v$ d. Positive; Negative.</p>		

Sl no.	Important Video link
1	https://www.youtube.com/live/zmIoo_DuWkA?si=Uc82lBaYixRBwMjn
2	https://youtu.be/r9RzgvId2UQ?si=Ivw7UoLoCAVUvFqe
3	https://youtube.com/shorts/61EJThzcbGQ?si=615XJPsIye0t86Cr

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LIGHT REFLECTION AND REFRACTION

Sl no.	Shortcut Tips/ Concept Map																			
1	<p>► Image formation by spherical mirrors :</p> <table border="1" data-bbox="359 533 1458 1178"> <thead> <tr> <th colspan="4" data-bbox="359 533 1458 589">Concave mirror</th> </tr> <tr> <th data-bbox="359 589 796 645">Ray diagram</th> <th data-bbox="796 589 999 645">Object position</th> <th data-bbox="999 589 1204 645">Image position</th> <th data-bbox="1204 589 1458 645">Nature of image</th> </tr> </thead> <tbody> <tr> <td data-bbox="359 645 796 913">(a) </td> <td data-bbox="796 645 999 913">At infinity</td> <td data-bbox="999 645 1204 913">At the focus F</td> <td data-bbox="1204 645 1458 913">Real, inverted and point-sized</td> </tr> <tr> <td data-bbox="359 913 796 1178">(b) </td> <td data-bbox="796 913 999 1178">Between infinity and the centre of curvature C</td> <td data-bbox="999 913 1204 1178">Between F and C</td> <td data-bbox="1204 913 1458 1178">Real, smaller than the object and inverted</td> </tr> </tbody> </table>				Concave mirror				Ray diagram	Object position	Image position	Nature of image	(a) 	At infinity	At the focus F	Real, inverted and point-sized	(b) 	Between infinity and the centre of curvature C	Between F and C	Real, smaller than the object and inverted
Concave mirror																				
Ray diagram	Object position	Image position	Nature of image																	
(a) 	At infinity	At the focus F	Real, inverted and point-sized																	
(b) 	Between infinity and the centre of curvature C	Between F and C	Real, smaller than the object and inverted																	

CHAPTER 9

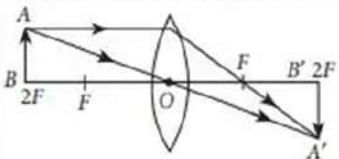
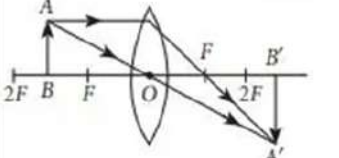
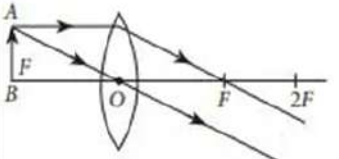
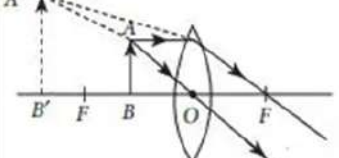
LIGHT REFLECTION AND REFRACTION

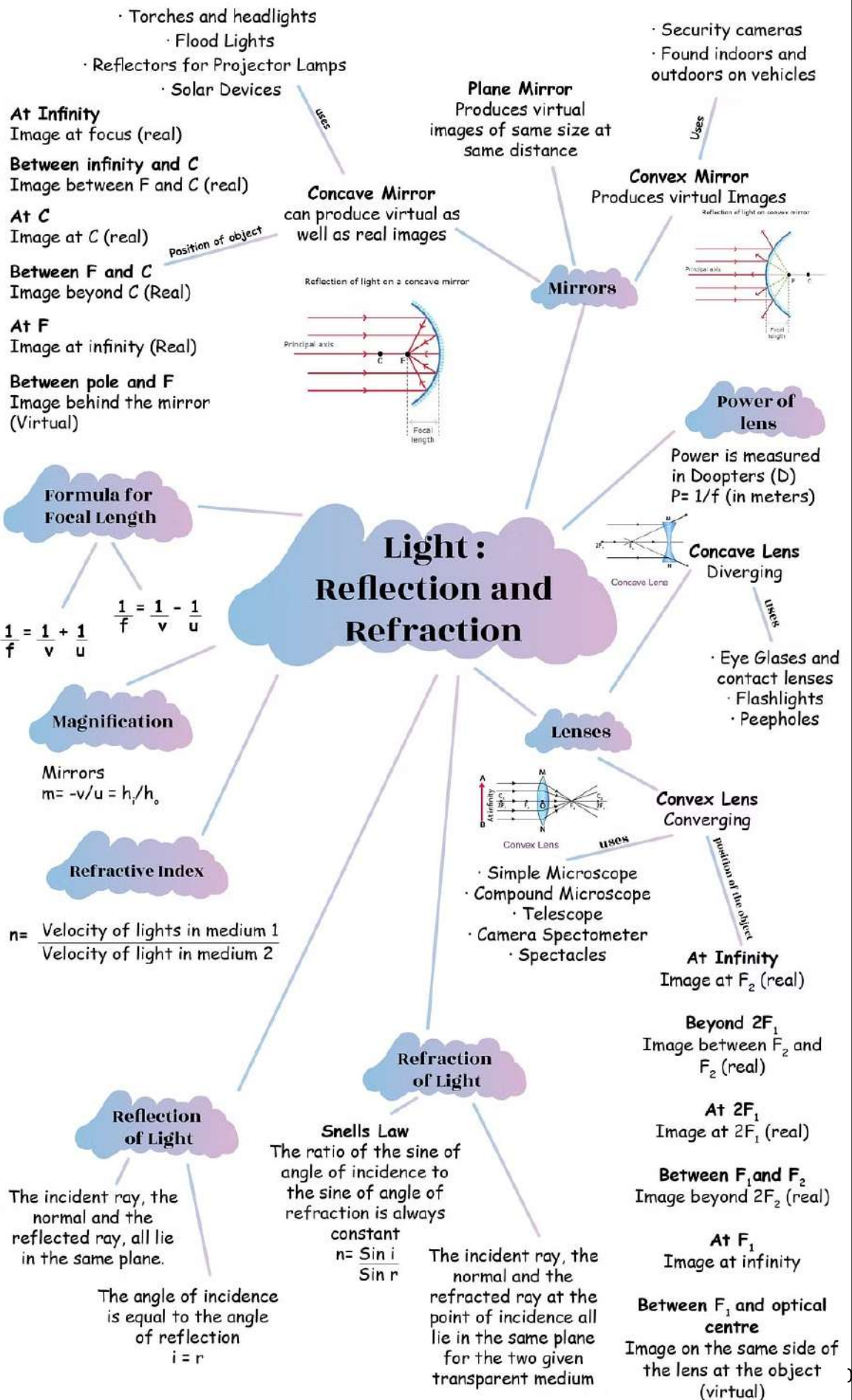
2	(c)		At C	At C	Real, same size and inverted
	(d)		Between C and F	Between C and infinity	Real, enlarged and inverted
	(e)		At F	At infinity	Real, infinitely large and inverted
	(f)		Between the pole P and F	Behind the mirror	Virtual, enlarged and erect

3	Concave lens				
		Ray diagram	Position of object	Position of image	Nature of image
	(a)		At infinity	At F	Virtual, erect and highly diminished
(b)		Between infinity and O	Between F and O	Virtual, erect and diminished	

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LIGHT REFLECTION AND REFRACTION

4	<p>(c) </p> <p>$u = -ve, v = +ve$ and $f = +ve$</p>	At $2F$	At $2F$	Real, inverted and same sized
	<p>(d) </p> <p>$u = -ve, v = +ve$ and $f = +ve$</p>	Between F and $2F$	Beyond $2F$	Real, inverted and enlarged
	<p>(e) </p> <p>$u = -ve, v = +ve$ and $f = +ve$</p>	At F	At infinity	Real, inverted and enlarged
	<p>(f) </p> <p>$u = -ve, v = -ve$ and $f = +ve$</p>	Between F and O	On the same side of the lens	Virtual, erect and enlarged
	<p>REFERENCES : https://pratibha.eenadu.net/tenth/lesson/telangana/english-medium/reflection-of-light-at-curved-surfaces/1-32-4-218-481-812-739-2041-20040002343</p>			

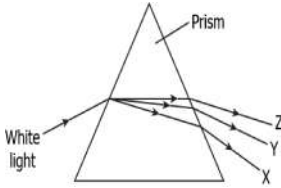


CHAPTER 9

LIGHT REFLECTION AND REFRACTION

CHAPTER 10

HUMAN EYE AND THE COLOURFUL WORLD

Q NO.	QUESTION	MARK
SECTION -A: MCQ (QN NO 1-10)		
1	<p>The image shows the dispersion of the white light in the prism</p>  <p>What will be the colours of the X, Y and Z? (a) X: red; Y: green; Z: violet (b) X: violet; Y: green; Z: red (c) X: green; Y: violet; Z: red (d) X: red; Y: violet; Z: green</p>	1
Ans	(b) X: violet; Y: green; Z: red	
2	<p>The ratio of near point and far point of human eye with normal vision is (a) 25cm (b) 100cm (c) zero (d) infinity</p>	1
Ans	(c) zero	
3	<p>Blue colour of clear sky is due to (a) reflection (b) refraction (c) dispersion (d) Rayleigh scattering</p>	1
Ans	(d) Rayleigh scattering	
4	<p>How many types of light sensitive cells are contained in the retina of eye ? (a) one type (b) two types (c) three types (d) four types</p>	1
Ans	(b) two types	
5	<p>The sense of vision is carried from eye to the brain by a) lens (b) retina (c) iris (d) optic nerve</p>	1
Ans	(d) optic nerve	
6	<p>The bluish colour in the deep sea is due to a) absorption of light by the sea water b) scattering of light c) reflection of sky in water d) the presence of different aquatic plants in water</p>	1
Ans	(b) scattering of light	
7	<p>The least distance of distinct vision (LDDV) for a young adult with normal vision is about (a) 25m (b) 25cm (c) 2.5cm (d) 2.5m</p>	1
Ans	(b) 25cm	
8	The nature of eye lens is	1


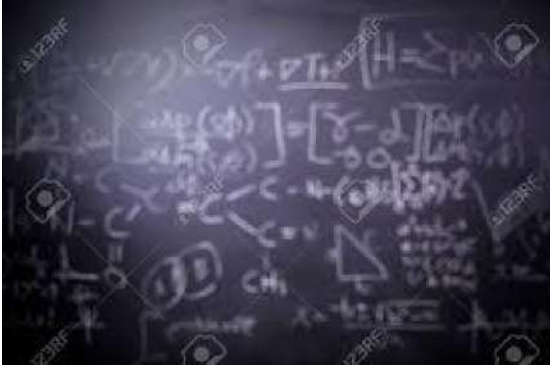
CHAPTER 10

HUMAN EYE AND THE COLOURFUL WORLD

	(a)concave (b) convex (c) both a and b (d) none of these	
Ans	(b) convex	
9	Power of accommodation of normal human eye is (a) +4D (b) -4D (c) +2.5D (d) -2.5 D	1
Ans	(a)+4D	
10	Which lens is used to correct a Hypermetropia eye ? (a) convex lens (b) concave lens (c) both a and b (d) neither a nor b	1
Ans	(b) convex lens	
ASSERTION REASONING QUESTIONS: (QN NO 11-12)		
	Assertion: (A). Reason: (R) CHOOSE THE CORRECT OPTION AS PER THE STATEMENTS GIVEN IN ASSERTION AND REASON: a) Assertion and Reason both are correct and R is the correct explanation of A. b) Assertion and Reason both are correct but R is not the correct explanation of A. c) Assertion is true but Reason is false. d) Assertion and Reason both are incorrect.	
11	Assertion: red colour is the signal of danger. Reason: red colour has smallest wavelength	1
Ans	(c) Assertion is true but Reason is false.	
12	Assertion : Power of convex lens is positive and power of concave lens is negative Reason : A concave lens diverges light rays falling on it.	1
Ans	(a) Assertion and Reason both are correct and R is the correct explanation of A.	
SECTION -B: PICTORIAL, KNOWLEDGE AND UNDERSTANDING (QN NO 13-17)		
13	A person needs a lens of – 5D for the correction of his vision. a) What is the defect of vision he is suffering from ? b) What is the nature of the corrective lens ?	2
Ans	a) Myopia b) Concave lens	
14	What are the two liquids (humours) present in eye ?	2
Ans	1. Aqueous humour 2. Vitreous humour	
15	What is the basic causes of atmospheric refraction ?	2
Ans	It is due to the variation in optical density of different layers of the atmosphere.	
16	A person went to an eye specialist for check up. Doctor prescribed him to use spectacle lens of +0.5 D. Find the focal length of the lens.	2
Ans	$f = 1/p$ so $1/0.5 \text{ m} = 2\text{m}$ or 200 cm	
17	Name two parts of the eye which refract light rays.	2
Ans	Cornea and eye lens	
SECTION -C : APPLICATION,EVALUATE,KNOWLEDGE AND ANALYSIS:(Q NO: 18-22)		

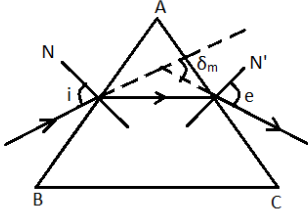
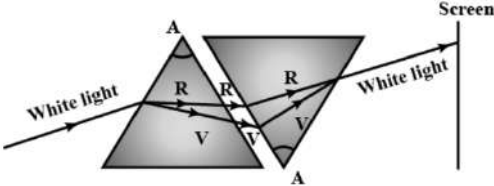

CHAPTER 10

HUMAN EYE AND THE COLOURFUL WORLD

18	(a) what is the advantage of having two eyes ? (b) name the part of the eye – i) controls the amount of light entering into eye. ii) regulates the size of the passage through which light enters.	3
Ans	(a) It gives wider field of view. (b) i) pupil (ii) iris	
19	 <p>News spread in a village that a villager has expired due to heart attack. But he has donated beautiful eyes to one of his friends. All the members of the village felt very sad for his untimely death, but on the other hand they were overwhelmed on hearing the donation of his eyes to his friend who would now be able to see this beautiful nature.</p> <ol style="list-style-type: none"> 1. Name the part of the eye that is used during eye plant. 2.. Name the defect that can be corrected by this transplant. 3.. What other organs can be donated after death. 	3
Ans	<ol style="list-style-type: none"> 1. Cornea. 2.. Defect caused due to cornea. 3.. Kidney, heart, liver etc 	
20	 <p>Seema and Swati are best friends and study in class X. Recently, Seema has been facing difficulty in reading the blackboard text from the last desk. Swati is little comfortable and wonders why Seema complains sitting on the last desk. Later on Seema told to her parents regarding the problem. They went to an eye specialist . He prescribed a lens of power -1.25 D for correction of her vision.</p> <ol style="list-style-type: none"> 1. Name the defect of the eye 2. Calculate the focal length of the lens? 3. What is the nature of the lens? 	3
Ans	<ol style="list-style-type: none"> 1. Myopia 2. $f = -0.8\text{m}$ 3. Diverging lens or concave lens 	

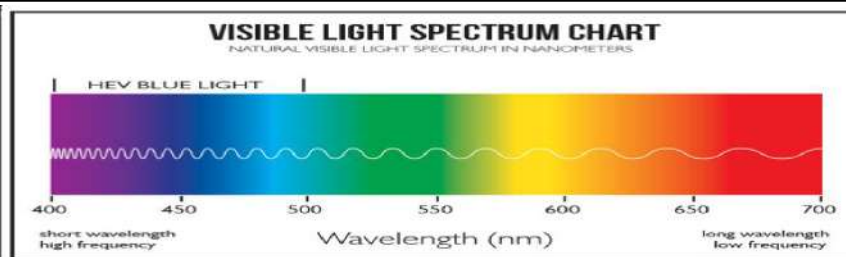
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21	<p>Study the following ray diagram. Identify the angle of incidence, angle of emergence and the angle of deviation.</p> 	3
Ans	angle of incidence $\angle i$, angle of emergence $\angle e$ and the angle of deviation $\angle \delta$	
22	<p>(a) Define the dispersion of white light. (b) Show the rays diagram through two identical prisms so that a white light incidents on one prism emerges out of the second prism as white light.</p>	3
Ans	<p>(a) The splitting of white light into its component colours is called dispersion of light. (b) When second prism is placed inverted to the first prism, the rays emerge out as white light as show the diagram.</p> 	
SECTION -D: CASE BASED QUESTIONS: (Q NO: 23- 24)		
23	 <p>Ankita and Nidhi are sisters. Both are students. One evening, while walking in a beach Nidhi, the younger sister noticed the red colour of the sky during the Sun set. She asked her sister why the sky sees read in colour. Ankita, who recently studied about light told that it happens because of scattering. Scattering is nothing but irregular reflection. Scattering of light depends on its wavelength. Red colour has long wavelength, because of which less scattering takes place. Blue scatters more. This type of scattering is known as selective scattering or Rayleigh's scattering. It happens when the size of the scattering particles are smaller than the wavelength of light. Otherwise all colours scatter in equal amount.</p>	4

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HUMAN EYE AND THE COLOURFUL WORLD



- (i) Which colour of light scatter less?
 A Red B Violet
 C Green D Yellow
- (ii) By analyzing the diagram write true or false
 a. Blue scatters more than red
 b. Red scatters more than orange
 c. Green scatters less than yellow
- (iii) Lights of red colour are used for danger signals. Why?
- (iv) The sky appears dark instead of blue to an astronaut. State its reason.

- Ans (i). (A) Violet
 (ii). (a) No, (b) Yes (c) No
 (iii) Due to large wavelength, red colour is least scattered and travel to large distance.
 (iv) The sky appears dark to the astronaut as scattering does not take place at very high altitude due to the absence of atmosphere.

24



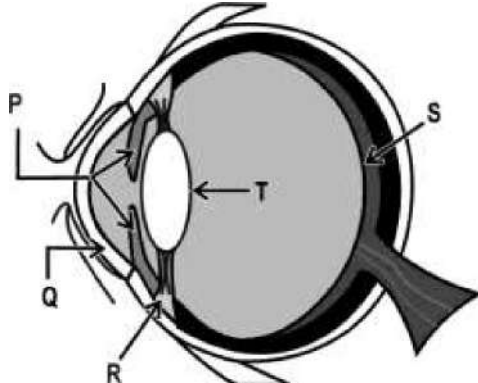
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- One day Anik and family were going to their village in a car. During the journey it was raining. Children were enjoying travelling in rain. It was a high range route. After sometime rain stopped and started to get bright sunlight. It was at that time, his younger son noticed a rainbow in the sky. His curious mind could not stop him to ask how it forms? Anik explained his children how a rainbow form
- (i). What are the phenomenon involved in the formation of rainbow?
 (ii). Which acts as prism in the formation of rainbow?
 (iii). Say yes or no to the following statements
 (a) Rainbow is formed on a sunny day without rain
 (b) Rainbow cannot be seen from the surface of moon
 (iv) Can you see a rainbow at night?

- Ans (i). Refraction, dispersion and internal reflection
 (ii). Water droplets present in the atmosphere
 (iii). (a) No (b) Yes
 (iv) Yes, the moon is bright enough to produce a rainbow, and while rare, people do see it. We all just have to get out more at night. Since the moon is not near as bright as the sun, the rainbow produced by the moon at night is much weaker than a

CHAPTER 10

HUMAN EYE AND THE COLOURFUL WORLD

	rainbow produced by the sun during the day. Our eyes see dim things as black and white, not in colour. So a night "moonbow" will look gray not colourful.	
SECTION – E: LONG ANSWER QUESTIONS:(Q NO: 25)		
25	<p>(a) What is myopia?.</p> <p>(b) Where would the image form in the eye by this defect ?</p> <p>(c) Name the type of lens that is used to correct myopia.</p> <div style="text-align: center;">  </div> <p>(d) Identify the parts of the eye labelled in the diagram from the descriptions given below by writing the labels as your answer.</p> <p>(i) It helps in changing the focal length of the lens.</p> <p>(ii) It causes most of the refraction of the light entering the eye.</p> <p>(iii) It controls the amount of light entering the eye.</p> <p>(iv) It acts as a screen on which the image is formed</p>	5
Ans	<p>(a) A person with myopia can see nearby objects clearly but cannot see distant objects clearly.</p> <p>(b) in front of the retina</p> <p>(c) concave lens</p> <p>(d) 0.5 marks each for the following:</p> <p>(i) R</p> <p>(ii) Q</p> <p>(iii) P</p> <p>(iv) S</p>	<p>1</p> <p>1</p> <p>1</p> <p>2</p>

Sl no.	Important Video link
1	www.youtube.com (Mind map for last minute Revision)
2	www.vedantu.com >revision notes,chapter-11
3	

S l n o.	Shortcut Tips/ Concept Maps
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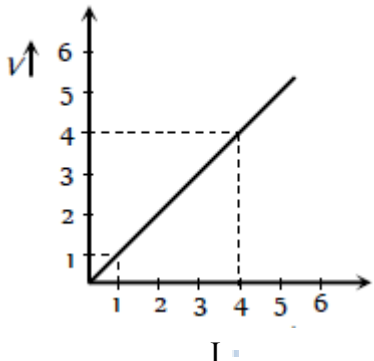
CHAPTER 10

HUMAN EYE AND THE COLOURFUL WORLD

1	
2	<p>REFERENCE :</p> <p>https://www.toppr.com/ask/content/posts/human-eye-and-colorful-world/mindmap-22066/</p>
3	

CHAPTER 11

ELECTRIC CURRENT

Q NO.	QUESTION	MARK
	SECTION -A: MCQ (QN NO 1-10)	
1	The S.I unit of current , potential difference and resistance respectively are: (a) volt , ampere & ohm respectively (b) ampere , volt & ohm respectively (c) ampere , ohm & volt respectively (d) volt,ohm & ampere respectively	1
Ans	(b) ampere , volt & ohm respectively	
2	How is ammeter and voltmeter connected in the circuit? (a) Both as series connection (b) Both as parallel connection (c) Voltmeter in series and ammeter in parallel connection (d) Ammeter in series connection and voltmeter in parallel connection.	1
Ans	(d) ammeter in series connection and voltmeter in parallel connection.	
3	A fuse wire should have: (a) high melting point and high resistance (b) low melting point and low resistance (c) low melting point and high resistance (d) high melting point and low resistance	1
Ans	(c) low melting point and high resistance REASON: when more current flow through the circuit, due to high resistance more heat will be produced and the fuse wire will break as melting point is low.	
4	Three bulbs of 40 W, 60W and 100W are connected in series. The current through the 40W bulb is 1A. The current through 100W bulb will be: (a) 0.4A (b) 0.6A (c) 0.8A (d) 1A	1
Ans	(d) 1A REASON: In a series connection, current through each device remains same	
5	 <p>The slope of potential difference(V) versus Current(I) is called as (a) resistance. (b) conductance</p>	1

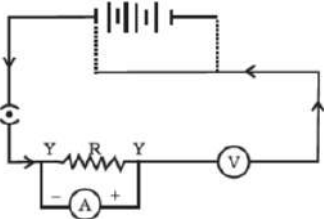
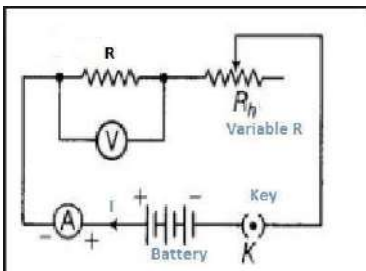
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ELECTRIC CURRENT

	(c) resistivity (d) power	
Ans	(a) REASON: $V/I=R$	
6	A bulb of resistance 80Ω draws a current of 0.75 A . The line voltage is: (a) 60V (b) 0.6V (c) 6V (d) 220V	1
Ans	(a) 60V REASON: $V=I \cdot R$ $\Rightarrow V=0.75 \times 80$ $\Rightarrow V=60\text{V}$	
7	If electron flow in a conductor from its one end "A" to other end "B", the direction of flow of current will be from: (a) A to B (b) B to A (c) midpoint of the conductor to "A" (d) midpoint of the conductor to "B"	1
Ans	(a) A to B	
8	The source of energy which provides the potential difference for the steady flow of current in the electric circuit is (a) ammeter (b) voltmeter (c) battery (d) all of the above	1
Ans	(c) battery	
9	The resistivity changes if : (a) the shape of the resistor is changed (b) the temperature is changed (c) the nature of material is changed. (d) both temperature and nature of material is changed	1
Ans	(d) both temperature and nature of material is changed	
10	To get the least resistance from a number of given resistors, they should be connected in: (a) series connection (b) parallel connection (c) half in parallel and half resistors in parallel. (d) none of the above.	1
Ans	(b) parallel REASON: $1/R(\text{parallel})= 1/R_1+1/R_2+1/R_n$	
ASSERTION REASONING QUESTIONS: (QN NO 11-12)		
	Assertion: (A) Reason: (R) CHOOSE THE CORRECT OPTION AS PER THE STATEMENTS GIVEN IN ASSERTION AND REASON: a) Assertion and Reason both are correct and R is the correct explanation of A.	

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	<p>b) Assertion and Reason both are correct but R is not the correct explanation of A.</p> <p>c) Assertion is true but Reason is false.</p> <p>d) Assertion and Reason both are incorrect.</p>	
11	<p>ASSERTION(A)-).Nichrome is used as heating element</p> <p>REASON(R): Its resistivity is very low while the melting point is very high.</p>	1
Ans	<p>(c) Assertion is true but Reason is false</p> <p>REASON: A heating wire should have high resistance to produce heat and low melting point.</p>	
12	<p>ASSERTION(A): When the length of a wire is doubled, the resistance also becomes double</p> <p>REASON(R): The resistance of a wire is directly proportional to its length.</p>	1
Ans	<p>(a) Assertion and Reason both are correct and R is the correct explanation of A.</p>	
SECTION -B: PICTORIAL, KNOWLEDGE AND UNDERSTANDING (QN NO 13-17)		
13	<p>A student has drawn the circuit diagram to study Ohm's law. He did not get full marks for his diagram in the exam. Identify Raj's mistake and redraw the diagram</p> 	2
Ans	 <p style="text-align: center;">Correct diagram</p> <p>Defects in the circuit-</p> <ol style="list-style-type: none"> 1. Cells are not properly connected 2. The voltmeter is connected in series and ammeter is connected in parallel. <p>The direction of current is incorrect</p>	
14	<p>V-I graph for two conducting wire are shown. Both the wires are made of same length and thickness. Temperature is constant for both. Which of the two is made up of material of high resistivity? Justify your answer.</p>	2

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Ans	Wire “A “has more resistance because greater the slope of the VI graph, more is the resistance.											
15	How does use of a fuse wire protect the electrical appliance?	2										
Ans	If current is larger than a specified flowing in a circuit, temperature of the fuse wire increases to its melting point. The fuse wire melts and the circuit breaks.											
16	What is the commercial unit of electrical energy? Represent it in terms of joules.	2										
Ans	The commercial unit of electrical energy is kilowatt-hour(kWh) known as a unit. $1\text{kWh} = 1000\text{W} \times 60\text{ s} \times 60\text{s}$ Or. $1\text{kWh} = 3.6 \times 10^6\text{J}$											
17	State ohm’s law	2										
Ans	Physical conditions remaining same, the current flowing through a circuit is directly proportional to the potential difference across its two ends.											
	SECTION -C : APPLICATION,EVALUATE,KNOWLEDGE AND ANALYSIS:(Q NO: 18-22)											
18	Write the difference between resistance and resistivity	3										
Ans	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">RESISTANCE</th> <th style="text-align: center;">RESISTIVITY</th> </tr> </thead> <tbody> <tr> <td>1. It is the measure of opposition offered by a material to the flow of electric current</td> <td>1. It is the measure of resistance offered by a material which is 1m long having cross section of 1m^2.</td> </tr> <tr> <td>2.S.I unit is ohm (Ω)</td> <td>2. S.I unit is ohm metre (Ωm)</td> </tr> <tr> <td>3.Depends on length and area of cross section</td> <td>3. Does not depend on area of cross section or length.</td> </tr> <tr> <td>4. It can be measured directly</td> <td>4. It can be calculated only by knowing the resistance and dimension of the object.</td> </tr> </tbody> </table>	RESISTANCE	RESISTIVITY	1. It is the measure of opposition offered by a material to the flow of electric current	1. It is the measure of resistance offered by a material which is 1m long having cross section of 1m^2 .	2.S.I unit is ohm (Ω)	2. S.I unit is ohm metre (Ωm)	3.Depends on length and area of cross section	3. Does not depend on area of cross section or length.	4. It can be measured directly	4. It can be calculated only by knowing the resistance and dimension of the object.	
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4. It can be measured directly	4. It can be calculated only by knowing the resistance and dimension of the object.											
19		3										
	In the given circuit , determine the value of: (a) Total resistance in the circuit. (b) Current flowing through the ammeter.											
Ans	Let R1 be the total resistance of 10Ω and 50Ω which are in series $R1 = 10\Omega + 50\Omega = 60\Omega$											

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	<p>R1 and 30Ω are in parallel, $R_p = (60 \times 30 / 60 + 30) = 20\Omega$ (b) $I = V/R_p = 6V/20\Omega$ $= 0.3\text{ A}$</p>	
20	<p>Three resistors, R1,R2,R3 are provided to you. Show how will you connect them to :</p> <p>(a) get maximum resistance (b) minimum resistance</p>	3
Ans	<p>(a) Connect all the three resistors in series resistance (b) connect all the three resistors in parallel connection</p> <div style="text-align: center;"> </div>	
21	<p>Give reason:</p> <p>(a) Copper and Aluminium wire are used for electricity transmission (b) Tungsten is used as a filament of electric lamp</p>	3
Ans	<p>(a) The resistivity of Cu & Al s very low and current can flow easily without much loss (b) Tungsten has high resistance and high melting point . It does not get oxidised even at very high temperature.</p>	
22	Write the factors on which the resistance of a conductor depends.	3
Ans	<p>(i)Length- R is directly proportional to length (ii)Inversely proportional to area of cross section (iii)Directly proportional to the temperature (iv)Nature of the material</p>	
23	<p>Three resistors of 3Ω each are connected to a battery of 3 V as shown. Calculate the current drawn from the battery.</p> <div style="text-align: center;"> </div>	
	<p>As given in circuit diagram, two 3Ω resistors are connected in series to form R1; so $R1 = 3\Omega + 3\Omega = 6\Omega$ And, R1 and R2 are in parallel combination, Hence, equivalent resistance of circuit (R_{eq}) given by $R_{eq} = 2\Omega$ Using Ohm's law, $V = IR$ We get, $3\text{ V} = I \times 2\Omega$ or $I = 3/2\text{ A} = 1.5\text{ A}$ Current drawn from the battery is 1.5 A.</p>	
24	<p>(i) List the three factors on which the resistance of a conductor depends. (ii) Write the SI unit of resistivity.</p>	

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	<p>(i) A conductor's resistance is influenced by the following factors:</p> <p>(1) Length of the conductor: The resistance (R) will increase as the conductor's length (l) increases. $R \propto l$</p> <p>(2) Area of the cross-section of the conductor: (as the cross-sectional area of the conductor increases, the resistance decreases). $R \propto \frac{1}{A}$</p> <p>(3) Nature of conductor.</p> <p>(ii) SI unit of resistivity is $\Omega \text{ m}$.</p>									
	SECTION -D: CASE BASED QUESTIONS: (Q NO: 25- 26)									
25	<p>A student is working on a science project that requires them to compare the brightness of two light bulbs, one connected in series and one connected in parallel</p> <p>(i) In which connection, both the bulb will glow with same brightness? Explain</p> <p>(ii) If one of the bulbs gets fused in both the type of connection, explain what will happen?</p> <p>(iii) Which out of the two is best for house hold wiring. Give reason</p>	4								
Ans	<p>(i) In parallel. It is because in parallel, both the bulb gets same voltage</p> <p>(ii) In series- the other bulb will also not glow. But in parallel , if one of the bulb gets fused, the other will glow</p> <p>(iii) Parallel. All appliances get same voltage but use different current. Each appliance can be controlled by their individual switch. If one appliance is fused, other will work without any problem</p>									
26	<p>Resistivity is a characteristic property of the material. It measures the resistance of a given dimensions of a specific material to conduct electricity. It is essential in many material application including resistors in electrical circuits, resistive heating and in super conductivity..</p> <p>(i) Arrange the following material in increasing order of increasing resistivity alloy, insulator, super conductors , semiconductor, and Conductor,</p> <p>(ii) If we take a lot of copper metal of resistivity $1.62 \times 10^{-8} \Omega \text{ m}$ and form a rod of 1m length and 1 m^2 area of cross section then what will be its resistance</p> <p>(iii) The following table given below shows the resistivity of three samples. Analyse the table and find out which is the best conductor and best insulator</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Sample</th> <th>Resistivity ($\Omega \text{ m}$)</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>3×10^{-8}</td> </tr> <tr> <td>Y</td> <td>11.1×10^{-6}</td> </tr> <tr> <td>Z</td> <td>18×10^{14}</td> </tr> </tbody> </table>	Sample	Resistivity ($\Omega \text{ m}$)	X	3×10^{-8}	Y	11.1×10^{-6}	Z	18×10^{14}	4
Sample	Resistivity ($\Omega \text{ m}$)									
X	3×10^{-8}									
Y	11.1×10^{-6}									
Z	18×10^{14}									
Ans	<p>(i) Super conductors < Conductors < alloys < semiconductor < insulator.</p> <p>(ii) Resistance = $\rho \times l/A$</p> <p>(iii) Best conductor X and best insulator Z</p>									
	SECTION – E: LONG ANSWER QUESTIONS:(Q NO: 27)									
27	<p>(a) Define Power and state its SI unit and define it. Write an expression relating electric power, potential difference and resistance</p>	5								

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	(b) A 6 V -12W lamp is connected in series with a source of 12 V supply. Calculate the value of the resistance R for the proper working of the lamp. What is the current flowing through the circuit?	
Ans	(a) Electric power is the rate at which energy is consumed or or dissipated.. Its SI unit is watt (W) . 1 watt can be defined as – When 1J of energy is consumed in 1second or when 1J of work is done in 1 sec, then the power is said to be 1 watt. Power(P)= V^2/R (b) $P=VI$, $I=P/V$ $= 12W/6V= 2A$ $R=V/I=6V/2A=3\Omega$	

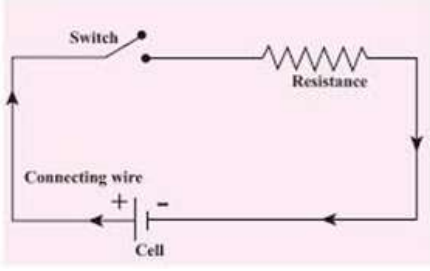
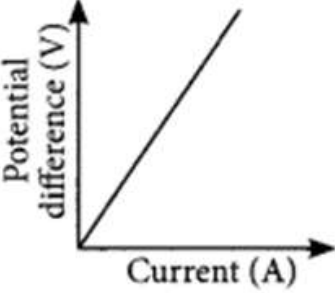
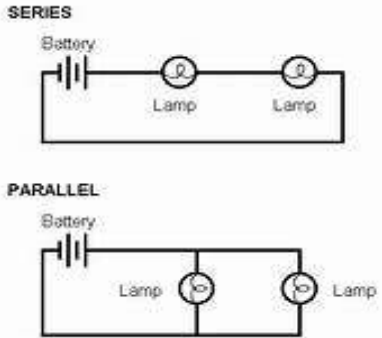
Sl no.	Important Video link
1	http://www.olabs.edu.in/?sub=74&brch=9
2	
3	https://drive.google.com/file/d/1JfwzIEoRMvFSOS4p0ccgA83aHV3C_Ylx/view?usp=sharing

Sl no.	Shortcut Tips/ Concept Map
1	https://docs.google.com/document/d/1GhXgcPimLVAMXT6lSA-XJpkiQRVHwMU1/edit?usp=sharing&oid=111819628367232108520&rtpof=true&sd=true

2	<p>THE IMPORTANT TOPIC IN THIS CHAPTER ARE:</p> <ul style="list-style-type: none"> ● Electric Current and Circuit ● Electric Potential and Potential Difference ● Circuit Diagram ● OHM's Law ● Factors on which the resistance of a conductor depends ● Resistance of a system of resistors ● Heating effect of electric current ● Electric Power
3	An electric circuit diagram












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4	<p>V-I graph</p> 
5	<p>Circuit showing parallel and series resistance</p> 
6	<p>Statement of ohm's law with mathematical expression</p> <p>It states that the potential difference V, across the ends of a given metallic wire in an electric circuit is directly proportional to the current flowing through it, provided its temperature remains the same. Mathematically,</p> $V \propto I$ $V = RI$ <p>where R is resistance of the conductor.</p>
7	<p>Symbols of components of electric circuit</p>

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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	

8	<p>Unit of power and its value</p> <p>We can define power as the rate of doing work, it is the work done in unit time. The SI unit of power is Watt (W) which is joules per second (J/s)</p> <p>Power = Work / time $P = W / t$</p>
9	<p>Heating effects of electric current</p> <p>Heating Effect of Electric Current</p> <p>When electric current flows through a metallic conductor then heat is produced.</p> <p>Metallic conductor has large number of electrons which move randomly. If a conductor is connected to source of electricity then free electrons move from negative terminal to positive terminal. They collide with atoms or ions of conductor and with each other. As a result of collision, kinetic energy of free electrons is transferred to atoms or ions. They then start vibrating with large amplitude. Thus, total energy of ions increases. This increase in energy increases the temperature. Heat is produced when electric current flows through conductor.</p> <p>$V = W/q$</p> <p>$W = V \times q$</p> <p>$q = I \times t$</p> <p>$W = VIt$</p> <p>$H = VIT$</p> <p>$V = IR$</p> <p>$H = I^2RT$</p> <p>$H = V^2T / R$</p> <p>The work done is equal to heat produced in the conductor.</p> <p>Joule's law can be stated as</p>

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The amount of heat produced in conductor is

(1) Directly proportional to square of electric current flowing through it.

(2) Directly proportional to resistance of conductor.

(3) Directly proportional to time for which electric current flow through conductor.

Practical Application of Heating Effect of Current

(1) Electric heater, iron, water heater work on heating effect of current

When these appliances are connected to supply of electricity they become hot but wires remain cold. They are made of nichrome (high resistivity and hence high resistance). Heat produce is directly proportional to the resistance of material through which current flows.

Nichrome has high resistance so large amount of heat is produced and filament of appliance become hot.

Connecting wires are made up of Cu or Al with small resistance, so small heat is produced and they remain cold.

(2) Electric bulb glows when electric current flows through filament of the bulb

Filament of an electric bulb is made up of tungsten with high melting point.

Filament is enclosed in a glass envelop which is filled with nitrogen and argon gas.

Since resistance of thin filament is very high, so large heat is produced as electric current which flow through filament. Due to its large amount of heat produced, filament of bulb become white hot. Hence filament of bulb emits light and heat.

(3) Electric fuse in the electric circuit melts when large current flows in the circuit

Electric fuse is a safety device connected in series with electric circuit. Electric fuse is a wire made up of material whose melting point is very low.(Cu or Sn alloy).

When large electric current flow through a circuit and hence through fuse wire, large amount of heat is produced. Due to this large heat, the fuse wire melts and

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	<p>circuit is broken so that current stop flowing in the circuit. This saves the electric circuit from burning.</p> <p>Electric fuses are rated as 1A,2A,3A,5A,10A.</p> <p>5A means maximum current that can flow through fuse wire.</p>
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CHAPTER 12

MAGNETIC EFFECT OF ELECTRIC CURRENT

Q NO.	QUESTION	MARK
	SECTION -A: MCQ (QN NO 1-16)	
1	The magnetic field lines due to a straight wire carrying current are (a) straight (b) circular (c) parabolic (d) elliptical	1
Ans	(b) circular	
2	The direction of the force on a current carrying wire placed in a magnetic field depends on (a) the direction of the current but not on the direction of the field. (b) the direction of the field but not on the direction of the current. (c) the direction of the current as well as the direction of the field. (d) neither the direction of the current nor the direction of the field.	1
Ans	(c) the direction of the current as well as the direction of the field.	
3	Appliances that have metal body are generally connected to the earthing wire. What is the reason to earth these wires? (a) To prevent excess of current. (b) To prevent the leakage of current. (c) To provide extra current to the appliances. (d) To provide high resistance to the appliances.	1
Ans	(b) To prevent the leakage of current.	
4	The strength of magnetic field inside a long current carrying straight solenoid is (a) more at the ends than at the centre. (b) minimum in the middle (c) same at all points. (d) found to increase from one end to the other.	1
Ans	(c) same at all points.	
5	At the time of short circuit, the current in the circuit: (a) reduces substantially (b) does not change (c) increases heavily (d) vary continuously	1
Ans	(c) increases heavily	
6	The most important safety method used for protecting home appliances from short circuiting and overloading is:	1

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MAGNETIC EFFECT OF ELECTRIC CURRENT

	(a) earthing (b) use of fuse (c) use of stabilisers (d) use of electric meter											
Ans	(b) use of fuse											
7	<p>Choose the incorrect statement from the following regarding magnetic lines of field:</p> <p>(a) The direction of magnetic field at a point is taken to be the direction in which the north pole of a magnetic compass needle points.</p> <p>(b) Magnetic field lines are closed curves.</p> <p>(c) If magnetic field lines are parallel and equidistant, they represent zero field strength.</p> <p>(d) Relative strength of magnetic field is shown by the degree of closeness of field lines.</p>	1										
Ans	(c) If magnetic field lines are parallel and equidistant, they represent zero field strength.											
8	<p>The factor on which the strength of the magnetic field doesn't depends:</p> <p>(a) Distance from the conductor.</p> <p>(b) Number of turns in the coil.</p> <p>(c) Current passing through the conductor.</p> <p>(d) Direction of the current in the conductor.</p>	1										
Ans	(d) Direction of the current in the conductor.											
9	<p>Column I contains some features of AC supply in India and column II contains their relevant values/ details. Match column I and II.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Column I</th> <th style="width: 50%;">Column II</th> </tr> </thead> <tbody> <tr> <td>(A) Value of the frequency (in Hz) of AC supply in India</td> <td>(i) Green</td> </tr> <tr> <td>(B) Colour of the earth wire in household wiring.</td> <td>(ii) 50</td> </tr> <tr> <td>(C) Colour of the wire in which the switch needs to be put in a domestic electric circuits.</td> <td>(iii) 15</td> </tr> <tr> <td>(D) Rating of the fuse wire (in A) used in domestic power circuits.</td> <td>(iv) Red</td> </tr> </tbody> </table> <p>(a) A-(i), B-(ii), C-(iii), D-(iv) (b) A-(iii), B-(i), C-(ii), D-(iv)</p>	Column I	Column II	(A) Value of the frequency (in Hz) of AC supply in India	(i) Green	(B) Colour of the earth wire in household wiring.	(ii) 50	(C) Colour of the wire in which the switch needs to be put in a domestic electric circuits.	(iii) 15	(D) Rating of the fuse wire (in A) used in domestic power circuits.	(iv) Red	1
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	(c) A-(ii), B-(i), C-(iv), D-(iii) (d) A-(iv), B-(iii), C-(ii), D-(i)	
Ans	(c) A-(ii), B-(i), C-(iv), D-(iii)	
10	<p>For a current in a long straight solenoid N and S poles are created at the two ends. Among the following statement, the incorrect statement is</p> <p>(a) The magnetic field lines inside the solenoid are in the form of straight lines which indicate that the magnetic field is same at all points in the solenoid.</p> <p>(b) The strong magnetic field produced inside the solenoid can be used to magnetised a piece of magnetic material, when soft iron is placed inside the coil.</p> <p>(c) The pattern of magnetic field associated with the solenoid is different from the pattern of the magnetic field around a bar magnet.</p> <p>(d) The N and S poles exchange positions when the direction of current through the solenoid is reversed.</p>	1
Ans	(c) The pattern of magnetic field associated with the solenoid is different from the pattern of the magnetic field around a bar magnet.	
11	<p>The direction of force on a current carrying conductor in a magnetic field is given by</p> <p>(a) Fleming's left hand rule.</p> <p>(b) Fleming's right hand rule.</p> <p>(c) Right hand thumb rule.</p> <p>(d) Left hand thumb rule.</p>	
Ans	<p>Answer: (a) Fleming's left hand rule.</p> <p>Explanation:</p> <p>Fleming's left-hand rule:- According to this rule, stretch the thumb, forefinger and middle finger of your left hand such that they are mutually perpendicular. If the first finger points in the direction of magnetic field and the second finger in the direction of current, then the thumb will point in the direction of motion or the force acting on the conductor.</p>	
12	<p>Which of the following is the property of a magnetic field?</p> <p>a) It can change the direction of a moving charged particle</p> <p>b) It can change the speed of a moving charged particle</p>	

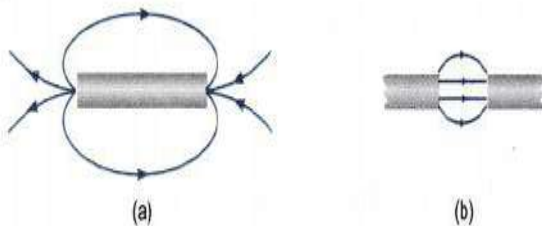
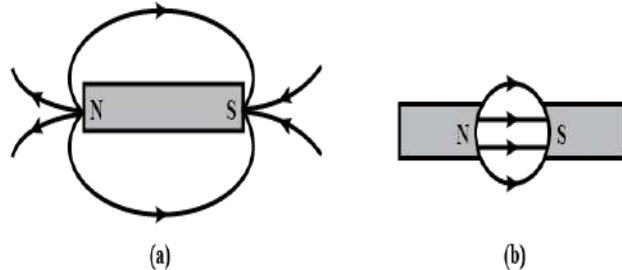
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MAGNETIC EFFECT OF ELECTRIC CURRENT

	<p>c) It can create an electric field</p> <p>d) It can create a gravitational field</p>	
Ans	<p>Answer: a) It can change the direction of a moving charged particle</p> <p>Explanation:</p> <p>When a particle is moved in magnetic field ,the magnetic force is perpendicular to velocity and magnetic field . Since force is perpendicular to velocity ,it only changes the direction of motion not the speed.</p>	
13	<p>Suppose one compass niddle is kept at magnetic field of a current carrying conductor. What will happen if the current is increased.</p> <p>(a) Deflection of the niddle will be same.</p> <p>(b) The compass niddle will show geographical north and south pole.</p> <p>(c) The deflection of the niddle will increase.</p> <p>(d) The deflection of the niddle will decrease.</p>	
Ans	<p>Answer: (c) The deflection of the niddle will increase.</p> <p>Explanation:</p> <p>The magnitude of the magnetic field produced at a given point increases as the current through the wire increases.</p>	
14	<p>An electron enters a magnetic field at right angles to it . The direction of force acting on the electron will be</p> <p>(a) to the right.</p> <p>(b) to the left.</p> <p>(c) out of the page.</p> <p>(d) into the page</p>	
Ans	<p>Answer :(d) into the page</p> <p>Explanation:</p> <p>The direction of force is perpendicular to the direction of magnetic field and current as given by Fleming’s left hand rule.</p>	
ASSERTION REASONING QUESTIONS: (QN NO 15-16)		
	<p>Assertion: (A).</p> <p>Reason: (R)</p> <p>CHOOSE THE CORRECT OPTION AS PER THE STATEMENTS GIVEN IN ASSERTION AND REASON:</p> <p>a) Assertion and Reason both are correct and R is the correct explanation of A.</p> <p>b) Assertion and Reason both are correct but R is not the correct explanation of A.</p> <p>c) Assertion is true but Reason is false.</p> <p>d) Assertion and Reason both are incorrect.</p>	
15	<p>Assertion (A): Copper is used to make electric wires.</p> <p>Reason (R): Copper has very low electrical resistance.</p>	1

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MAGNETIC EFFECT OF ELECTRIC CURRENT

Ans	Option (a) Assertion and Reason both are correct and R is the correct explanation of A.	
16	Assertion (A): In Fleming's Left Hand rule, the direction of magnetic field, force and current are mutually perpendicular. Reason (R): Fleming's Left Hand rule is applied to measure the induced current.	1
Ans	Option (c) Assertion is true but Reason is false.	
	SECTION -B: PICTORIAL, KNOWLEDGE AND UNDERSTANDING (QN NO 17-21)	
17	State two factors on which the magnetic field produced by a current carrying straight conductor depends.	2
Ans	Factors on which the magnetic field produced by a current carrying conductor depends: (i) Strength of the current passing through the conductor. (ii) Distance of the point of measurement from the conductor.	
18	Identify the poles of the magnet in the figure (a) and (b) shown below. 	2
Ans	The magnetic field lines emerge from north pole and merge at the south pole. 	
19	Name and state the rule which helps to find the direction of magnetic field produced by a current carrying straight conductor.	2
Ans	Right hand thumb rule gives the direction of magnetic field produced by a current carrying straight conductor. Right hand thumb rule- If we are holding a current carrying straight conductor in right hand such that the thumb points toward the direction	

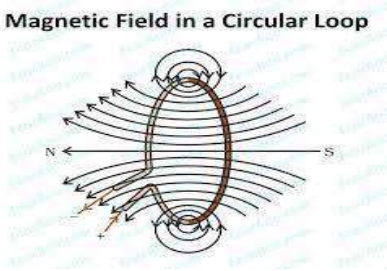
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	of current, then the fingers wrap around the conductor will be in the direction of the magnetic field lines.	
20	List four properties of magnetic field lines.	2
Ans	(i) Two magnetic field lines never intersect each other. (ii) Magnetic field lines arise from North pole and end in South pole of the magnet. (iii) Magnetic field lines are closed curve outside the magnet. (iv) Direction of the magnetic field lines inside the magnet is from South pole to North pole.	
21	Name and state the rule used to determine the direction of force experienced by a current carrying conductor placed in a uniform magnetic field.	2
Ans	The direction of force which acts on the current carrying conductor placed in a magnetic field is given by Fleming's Left Hand rule. It states that if the fore finger, thumb and the middle finger of left hand are stretched mutually perpendicular to each other and the fore finger points along the direction of external magnetic field, middle finger in the direction of current then thumb will indicate the direction of force acting on the conductor.	
	SECTION -C : APPLICATION,EVALUATE,KNOWLEDGE AND ANALYSIS:(Q NO: 22-29)	
22	(i) Why is it necessary to provide a fuse in an electric circuit? (ii) An air conditioner of 2kW is used in an electric circuit having a fuse of 10A rating. If the potential difference of the supply is 220V, will the fuse able to withstand, when the air conditioner is switched on? Justify your answer.	3
Ans	(i) Fuse prevents damage to appliance due to over-loading or short circuiting. (ii) Here $P= 2\text{kW} = 2000\text{W}$ $V= 220\text{V}$ $P= VI, I= P/V$ $I= 2000/220$	

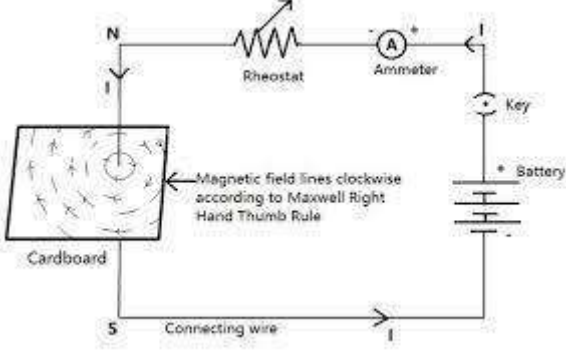
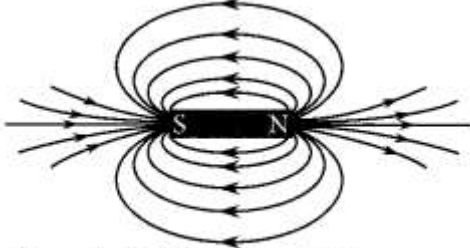
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	<p>$I = 9.09A$</p> <p>As the current is 9.09A, below the rating of fuse, the fuse will withstand means fuse will not break down when AC is switched ON.</p>	
23	<p>(i) Draw the pattern of magnetic field lines due to a magnetic field through and around a current carrying circular loop.</p> <p>(ii) Name and state the rule to find out the direction magnetic field inside and around the loop.</p>	3
Ans	<p>(i)</p> <div style="text-align: center;">  <p>Magnetic Field in a Circular Loop</p> </div> <p>(ii) Right hand thumb rule- If we are holding a current carrying straight conductor in right hand such that the thumb points toward the direction of current, then the fingers wrap around the conductor will be in the direction of the magnetic field lines.</p>	
24	<p>Can a freely suspended current carrying solenoid align in any direction? Justify your answer. What will happen when the direction of current in the solenoid is reversed? Explain.</p>	3
Ans	<p>A current carrying solenoid behaves like a bar magnet. When freely suspended, solenoid will align in north south direction.</p> <p>On reversing the direction of current in the solenoid, its polarity will be reversed and so it will turn at 180°.</p>	
25	<p>Draw the pattern of the field lines of the magnetic field around a current carrying straight conductor passing through and held perpendicular to a horizontal cardboard. Explain how right hand thumb rule is useful to determine the direction of the magnetic field in the above case, if the direction of current in the conductor is vertically downwards.</p>	3

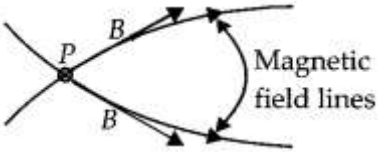
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Ans	 <p>In this case, the current flows downwards, so the magnetic field lines go clockwise.</p>	
26	List three factors which can cause overloading of domestic electric circuit.	3
Ans	<p>Three factors which can cause overloading are:</p> <ul style="list-style-type: none"> (i) When the live wire and the neutral wire come into direct contact. (ii) By connecting too many appliances to a single socket. (iii) Accidental increase in voltage supply. 	
27	<p>What are magnetic field lines? Justify the following statements:</p> <ul style="list-style-type: none"> (a) Two magnetic field lines never intersect each other. (b) Magnetic field are closed curves. 	
Ans	<p>Imaginary continuous closed curves used to represent the magnetic field in a region is known as magnetic field lines. It is directed from north pole to south pole outside the magnet and south pole to north pole inside the magnet.</p>  <p>Magnetic field lines around a bar magnet</p> <p>(a) The direction of magnetic field (B) at any point is obtained by drawing a tangent to the magnetic field line at that point. In case, two magnetic field lines intersect each other at the point P as shown in figure, magnetic field at P will have two directions, shown by two</p>	

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	<p>arrows, one drawn to each magnetic field line at P, which is not possible.</p>  <p>(b) It is taken by convention that the field lines emerges from north pole and merge at the south pole. Inside the magnet, the direction of field lines is from its south pole to its north pole. Thus, the magnetic field lines are closed curves.</p>	
28	<p>State how the magnetic field produced by a straight current carrying conductor at a point depends on</p> <p>(a) current through the conductor</p> <p>(b) distance of point from conductor.</p>	
Ans	<p>Strength of magnetic field produced by a straight current-carrying wire at a given point is</p> <p>(a) directly proportional to the current passing through it.</p> <p>(b) inversely proportional to the distance of that point from the wire.</p> $i.e., B \propto \frac{I}{r} \left\{ \begin{array}{l} B \rightarrow \text{magnetic field} \\ I \rightarrow \text{current} \\ r \rightarrow \text{distance between wire and point of observation} \end{array} \right.$	
29	<p>State three factors on which the strength of magnetic field produced by a current carrying solenoid depends.</p>	
Ans	<p>Strength of magnetic field produced by a current carrying solenoid depends upon the following factors:</p> <ul style="list-style-type: none"> ● number of turns in the coil ● amount of current flowing through it ● radius of coil <p>Material of core of the solenoid</p>	
SECTION -D: CASE BASED QUESTIONS: (Q NO: 30- 32)		
30	<p>In our homes, we receive supply of electric power through a main supply (also called mains), either supported through overhead electric poles or</p>	4

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	<p>by underground cables. One of the wires in this supply, usually with red insulation cover, is called live wire (or positive). Another wire, with black insulation, is called neutral wire (or negative). In our country, the potential difference between the two is 220 V. It provides safety for all the appliances and devices connected at home which have a metallic body. This is done to prevent shock when leakage of charges happens in the metallic body. Each appliance has a separate switch to 'ON'/'OFF' the flow of current through it. In order that each appliance has equal potential difference, they are connected parallel to each other.</p> <div data-bbox="486 712 1117 1041" data-label="Diagram"> </div> <p>(i) Name two safety measures commonly used in electric circuits and appliances.</p> <p>(ii) Give one difference between wires used in the element of an electric heater and in a fuse.</p> <p>(iii) List two advantages of parallel connection over series connection.</p>	
<p>Ans</p>	<p>(i) Two safety measures commonly used in electric circuits and appliances are fuse and earthing of appliances.</p> <p>(ii) Wire used in the element of an electric heater has high melting point while the wire used in the fuse has low melting point.</p> <p>(iii) (a) Each appliance has equal potential difference. (b) Each appliance has separate switch to ON/OFF the flow of current through it.</p>	
<p>31</p>	<p>A student fixes a sheet of white paper on a drawing board. He places a bar magnet in the centre of it. He sprinkles some iron fillings uniformly around the bar magnet. Then he taps the board gently and observes that the iron fillings arrange themselves in a particular pattern.</p> <p>(i) Why do the iron fillings arrange themselves in a particular pattern? (a) Due to external force applied on the magnet.</p>	<p>4</p>

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	<p>(b) Due to force exerted by the magnet outside the magnetic field.</p> <p>(c) Due to the force exerted by magnet within its magnetic field.</p> <p>(d) Due to pressure of the magnetic field.</p> <p>(ii) What do the lines along which the iron filings align represent?</p> <p>(a) North pole and south pole of the magnet.</p> <p>(b) Strength of the magnet.</p> <p>(c) Magnetic field lines.</p> <p>(d) Gravitational force.</p> <p>(iii) What does the crowding of iron filings at the end of the magnet indicate?</p> <p>(a) Magnetic field is strongest near the poles of the magnet.</p> <p>(b) Magnetic field is weakest near the poles of the magnet.</p> <p>(c) There is no significant magnetic field at the poles of the magnet.</p> <p>(d) The significance of polarity.</p> <p>(iv) the close magnetic field lines indicate:</p> <p>(a) Magnetic field in that region is weak.</p> <p>(b) Magnetic field in that region is strong.</p> <p>(c) Magnetic field in that region is zero.</p> <p>(d) North and South poles are closer.</p>	
Ans	<p>(i) (c) Due to the force exerted by magnet within its magnetic field.</p> <p>(ii) (c) Magnetic field lines.</p> <p>(iii) (a) Magnetic field is strongest near the poles of the magnet.</p> <p>(iv) (b) Magnetic field in that region is strong.</p>	
32	<p>A current carrying conductor is placed in a magnetic field. Now answer the following.</p> <p>(i) List the factors on which the magnitude of force experienced by conductor depends.</p> <p>(ii) When is the magnitude of this force maximum?</p> <p>(iii) State the rule which helps, in finding the direction of motion of conductor.</p> <p>(iv) If initially this force was acting from right to left, how will the direction of force change if:</p>	

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	(a) direction of magnetic field is reversed? (b) direction of current is reversed?	
	<p>i) When a current carrying wire is placed in a magnetic field, it experiences a magnetic force that depends on</p> <p>(a) current flowing in the conductor (b) strength of magnetic field (c) length of the conductor (d) angle between the element of length and the magnetic field.</p> <p>(ii) Force experienced by a current carrying conductor placed in a magnetic field is largest when the direction of current is perpendicular to the direction of magnetic field.</p> <p>(iii) The rule used in finding the direction of motion of the conductor placed in a magnetic field is Flemings left hand rule. Fleming's left hand rule is as follows: Stretch out the thumb, the forefinger, and the second (middle) finger of the left hand so that these are at right angles to each other. If the forefinger gives the direction of the magnetic field (N to S), the second (middle) finger the direction of current then the thumb gives the direction of the force acting on the conductor.</p> <p>(iv) (a) Direction of force will be reversed when direction of magnetic field is reversed, i.e., now force on conductor will act from left to right. (b) Direction of force will be reversed, if the direction of current is reversed, i.e., the force on the conductor will act from left to right.</p>	
	SECTION – E: LONG ANSWER QUESTIONS:(Q NO: 33)	
33	(i) What is meant by the term alternating current and direct current? (ii) Name a source of alternating current and a source of direct current. (iii) Mention the frequency of AC supply in India.	5

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	(iv) State two important advantages of alternating current over direct current.	
Ans	(i) If the current changes direction after equal intervals of time it is called alternating current. If the current always flows in the same direction, it is called direct current. (ii) Source of alternating current- Thermal power stations Source of direct current- Electric cell (iii) Frequency of AC supply in India is 50 Hz. (iv) (a) AC electric power can be transmitted over long distances without much loss of energy than DC. (b) AC is less expensive and easy to generate than DC.	

Sl no.	Important Video link
1	https://youtu.be/SUIuusdeD_Q?si=LYphcFr mmj-rTZS
2	
3	

Sl no.	Shortcut Tips/ Concept Map
1	https://docs.google.com/document/d/19I2At5g6XVenXx2NXvUsfWrmcFrs7JOy/edit?usp=sharing&oid=111535952468477467767&rtpof=true&sd=true
2	https://docs.google.com/document/d/1DzmxeEYvdDnjhx5wLEdCSGI99pTeqNSH/edit?usp=sharing&oid=111535952468477467767&rtpof=true&sd=true

3	<u>Magnetic field and field lines:</u> <ul style="list-style-type: none">● Magnetic field is the region surrounding a magnet in which the force of that magnet is effective or get detected.● Magnetic field is the vector quantity which has both magnitude as well as direction.● The path along which magnetic field travels is called as magnetic field lines.● Magnetic field lines start from north pole and ends at South pole.
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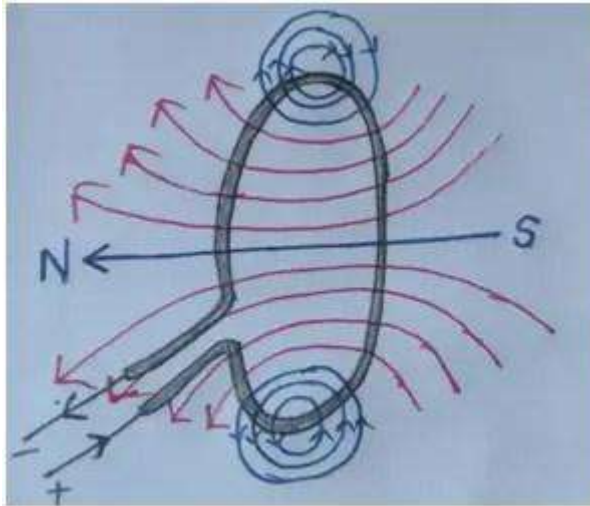
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- That means magnetic field lines are the closed curves.
- Where the magnetic field lines are crowded there is strong magnetic field.
- And where the magnetic field lines are more distant there is a weak magnetic field.
- No two magnetic field lines cross each other.

Right hand thumb rule:

According to right hand thumb rule, if we stretched right hand such that thumb is outstretched and fingers are curled around it. Then the curled finger gives the direction of magnetic field and thumb gives the direction of current.

Magnetic field due to a current through a circular loop:



Fig, magnetic field produced due to circular loop

- The magnetic field produced at every point of a current carrying circular loop in the form of concentric circles and the loops become larger and larger as we move away from the wire.
- If the circular coil has n turns then the magnetic field produced is n times larger than the field produced by single turn.
- Because current in each circular turn has same direction and hence field due to each turn get added.

Magnetic field due to a current in solenoid:

- Solenoid is the cylindrical shaped coil on which many number of circular turns of insulated copper wire are wrapped closely.
- The magnetic field lines in the solenoid are in the form of parallel straight lines. Which means the magnetic field inside the solenoid at every point is same.
- And hence we can say that the magnetic field inside the solenoid is uniform.

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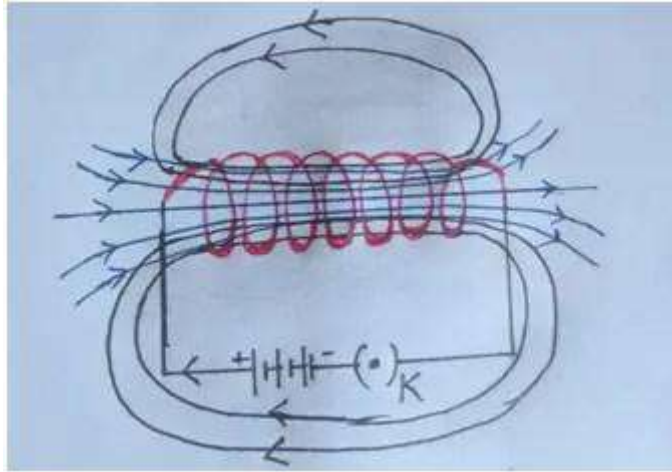


Fig. magnetic field produced in a solenoid

Force on a current carrying conductor in a magnetic field:

- Fleming's left-hand rule gives the direction of the motion or force acting on the conductor.
- According to Fleming's left-hand rule, if we stretched out thumb, forefinger and middle finger of our left hand in a such way that they are mutually perpendicular to each other then if the forefinger is giving direction of magnetic field and middle finger is giving the direction of the current then the thumb gives the direction of motion or the direction of the force acting on the conductor.

Electric motor:

Principle:

- The principle of electric motor is based on the magnetic effect of electric current. According to which when a current carrying coil is placed in magnetic field then there will be force acting on the coil which rotates it. This is the principle of electric motor.
- Electric motor is a rotating device which converts electrical energy into mechanical energy. The figure shows the labelled diagram of simple electric motor.

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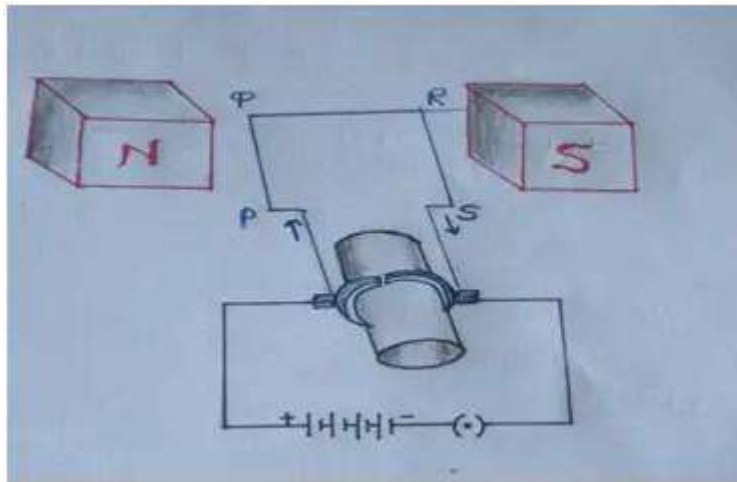


Fig. electric motor

- In electric motor, split rings act as a commutator which reverse the direction of flow of current through the circuit. Due to reversing the current direction the magnetic force also gets reversed. And hence the coil is rotating continuously.
- Electric motors are used in water pumps, electric fans, washing machines, electric mixers etc.

Electromagnetic induction:

- Electromagnetic induction is the phenomenon of producing electromotive force by changing the magnetic field around the electric conductor and vice versa.
- In current lamps, electric generators, induction cooking, induction motors, induction sealing the phenomenon of electromagnetic induction is used.

Fleming's right-hand rule:

- Fleming's right-hand rule gives the direction of current induced in the conductor.
- According Fleming's right-hand rule if we stretched out thumb, forefinger and middle finger of right hand in a such way that they are mutually perpendicular to each other. And if forefinger gives the direction of magnetic field, thumb gives the direction of the motion of the conductor then middle finger gives the direction of the motion of the conductor.

Electric Generator:

Principle:

- The electric generator works on the principle of electromagnetic induction. When a straight conductor is continuously moved in a strong magnetic field then current is induced in the conductor.

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- By using this phenomenon in electric generator, mechanical energy is used to rotate the conductor in a magnetic field to produce electricity.

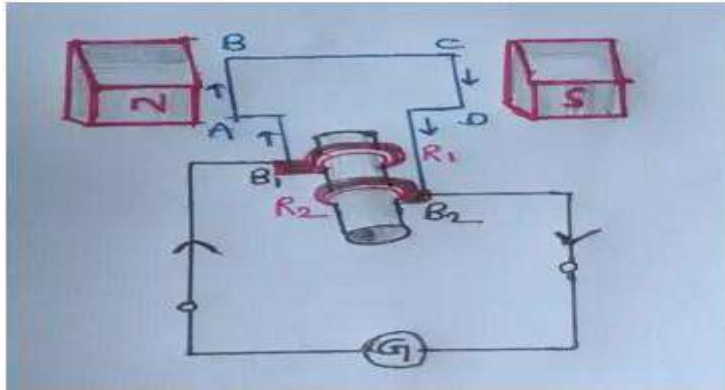


Fig. Electric Generator

Domestic electric circuits:

- Fuse wire is a safety device connected in series in electrical circuits to protect the circuit from the extra current flow. The rating of the fuse wires is fixed.
- When the extra current greater than the rating flows through the circuit, due to which fuse get heated and melts to break the circuit and protect the electrical appliances from damaging

Following are the precautions taken to avoid the overloading of domestic electric circuit:

- We don't have to connect many electric appliances to a single socket and avoid to use them at same time also.
- The appliances having some faults or damage we have to not connect them in the circuit.
- And we have to use fuses of proper rating in series with the circuit which protect the whole circuit and also electric appliances.
- Also, we have to use earthing system so that we get protected from severe shock.

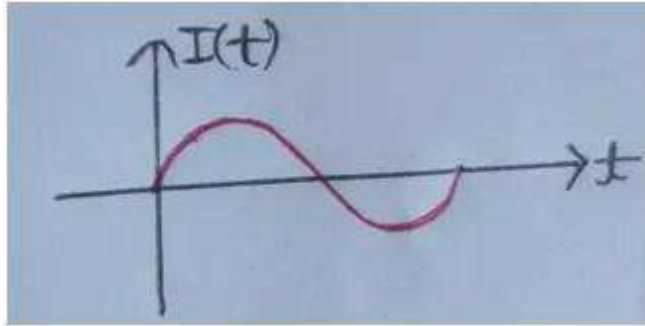
Alternating Current:

In AC currents, charge flows in both direction that is AC current changes its direction periodically and hence it is also called as bidirectional current.

In India frequency of AC is 50 Hz.

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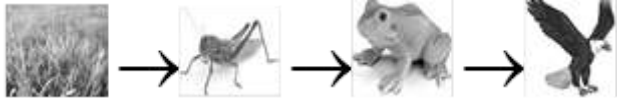
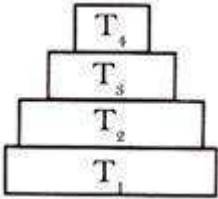


Direct Current:

- In DC current charge flows only in one direction and hence it is also called as uni-directional current.
- Frequency of DC current is zero. The magnitude of DC current is fixed or constant. DC circuit possesses mostly resistor only.

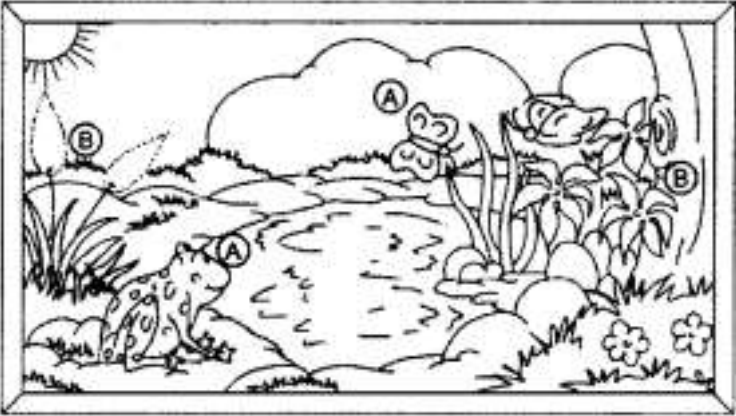
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Q NO.	QUESTION	MARK
SECTION -A: MCQ (QN NO 1-10)		
1	Identify the biotic components from the following:- a)plants, microorganisms, soil c)birds, human beings, insects b)insects, rainfall, birds d)soil, plants, insects	1
Ans	c)birds, human beings, insects	
2	Which of the following statements best describes the food web? a) Sequence of living organisms in a community in which one organism consumes another organism to transfer food energy. b) Inter - connected food chains operation in an ecosystem which establish a network of relationships between various species. c) A diet which contains all the nutrients in appropriate amount. d) A food chain that contains only herbivores.	1
Ans	b) Inter - connected food chains operation in an ecosystem which establish a network of relationships between various species.	
3	Various steps in a food chain represent: (a) food web (b) trophic level (c) ecosystem (d) biomagnification	1
Ans	(b) trophic level	
4	In the following food chain eagle is at which trophic level?  a) Second trophic level b) First trophic level c) Fourth trophic level d) Third trophic level	1
Ans	c) Fourth trophic level	
5	At which trophic level the minimum energy is available in the given pyramid?  a) T1 b) T2 c) T3 d) T4	1

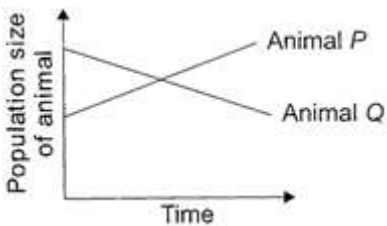
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Ans	d) T4	
6	 <p>An ecosystem is represented in the figure given above. This ecosystem will be self- sustaining if</p> <p>(a) the type of organisms represented by B are eliminated. (b) materials cycle between the organisms labelled A and the organisms labelled B. (c) the organisms labelled A outnumber the organisms labelled B. (d) the organisms labelled A are equal in number to the organisms labelled B.</p>	1
Ans	(b)materials cycle between the organisms labelled A and the organisms labelled B.	
7	<p>In the given food chain plants → goat →man, if 100 J of energy is available at the producer level, then the energy transferred to the man is_____.</p> <p>a) 10J b) 1J c) 0.1J d) 100J</p>	1
Ans	b)1J	
8	<p>Increase in the concentration of harmful chemical substances in the body of living organisms is known as:</p> <p>a) Biological oxygen demand b) Biomagnification c) Biosynthesis d) Biogeochemical cycle</p>	1
Ans	b) Biomagnification	

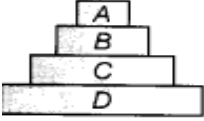
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9	<p>O₂ is converted to O₃ by _____ radiations.</p> <p>a) Gamma radiations b) Infrared radiations c) Ultraviolet radiations d) Cosmic radiations</p>	1
Ans	c) Ultraviolet radiations	
10	<p>Two types of animals, P and Q, were placed in a confined research area with sufficient water and plants for the consumption of animals. The given graph is plotted after observing animals over a period of time. Which of the following is incorrect regarding this?</p>  <p>a) Animal P comes under the category of prey. b) Animal Q comes under the category of predator. c) Animal Q is carnivore and animal P is herbivore. d) All of these</p>	1
Ans	d) All of these	
11	<p>Why is it difficult to degrade non-biodegradable wastes?</p> <p>a) Because non-biodegradable wastes cannot be recycled. b) Because microorganisms cannot decompose it. c) They can be made into organic wastes. d) All of the above</p>	
Ans	b) Because microorganisms cannot decompose it.	
ASSERTION REASONING QUESTIONS: (QN NO 11-12)		
	<p>Assertion: (A). Reason: (R) CHOOSE THE CORRECT OPTION AS PER THE STATEMENTS GIVEN IN ASSERTION AND REASON:</p> <p>a) Assertion and Reason both are correct and R is the correct explanation of A. b) Assertion and Reason both are correct but R is not the correct explanation of A. c) Assertion is true but Reason is false.</p>	

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	d) Assertion and Reason both are incorrect.	
12	Assertion: Aquarium needs regular cleaning Reason: There are no microbes to clean water in aquarium, therefore, it needs to be regularly cleaned.	1
Ans	(a) Both 'A' and 'R' are true and 'R' is correct explanation of the assertion	
13	Assertion: Food chain is responsible for the entry of harmful chemicals in our bodies Reason: The length and complexity of food chains vary greatly	1
Ans	(b) Both 'A' and 'R' are true but 'R' is not correct explanation of the assertion.	
	SECTION -B: PICTORIAL, KNOWLEDGE AND UNDERSTANDING (QN NO 13-17)	
14	Energy flow in food chain is unidirectional Explain	2
Ans	The energy from the sun flows into autotrophs and it passes to herbivores and then to carnivores. The energy does not reverse from autotrophs to the solar input or from herbivores back to autotrophs. Hence the flow is unidirectional	
15	A teacher draws the pyramid of energy on board and writes A, B, C and D, in each trophic level as shown in the diagram given. What does each level indicate?	2
		
Ans	D indicates producers. C indicates primary consumers. B indicates secondary consumers. A indicates tertiary consumers	
16	What will happen if deer is missing in the food chain given below? Grass → Deer → Tiger	2
Ans	If deer is missing in the given food chain, there will not be sufficient food for the tigers. Some of the tigers will die because of starvation and hence, the population of tigers will decrease. Since, grass is eaten by deer, the population of grass will also increase when deer is missing.	
17	How can one create an artificial aquatic ecosystem, which is self-sustainable?	2
Ans	Large jar filled with water, oxygen, food and aquatic plants and animals. Oxygen/oxygen pumps. Fish food. Aquatic plants /producers provide O ₂ during photosynthesis. Aquatic animals / consumers release CO ₂ for the process of photosynthesis. Decomposers are also important for natural cleaning of the aquarium.	
18	Give reason why a food chain cannot have more than four trophic levels	2
Ans	The loss of energy at each step is so great that very little usable energy remains after four trophic levels.	
	SECTION -C : APPLICATION,EVALUATE,KNOWLEDGE AND ANALYSIS:(Q NO: 19-22)	

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19	What are decomposers? List two important roles they play in the environment. What will be the consequence of their absence in an ecosystem?	3
Ans	<p>a) Decomposers are microorganisms including bacteria and fungi which decompose or break-down the complex organic compound present in dead plants and animals into simpler substances.</p> <p>b) Role of decomposers in environment are-</p> <ul style="list-style-type: none"> • They help in decomposing dead bodies of plants and animals and hence act as cleansing agents of environment. • They help in recycling of materials in the ecosystem to maintain its stability. <p>c) The consequence of their absence in an ecosystem can be disastrous. The dead bodies would persist for long, leading to their accumulation and thus, polluting the environment. The biogenetic nutrients associated with these remains will not be returned back to the environment. As a result, all the nutrients present in soil, air and water would soon be exhausted and the whole life cycle of organisms will be disrupted.</p>	
20	In the following food chain, 100 J of energy is available to the Tiger. How much energy was available to the plants? Plants → Deer → Tiger	3
Ans	As per 10% law of flow of energy in an ecosystem only 10% of energy is received by the next trophic level. Hence, in the given food chain, If 100 J of energy is available to Tiger, the plants or producers have 10,000 J of energy available to them.	
21	Sita and Lata are neighbours in a colony. Sita maintains a compost pit by using bio-degradable household wastes. Lata throws the household waste in two separate dustbins. a) Whom will you support and why? b) How is Sita justified. c) Maintaining two dustbins for bio-degradable and non-biodegradable wastes is a good idea then how is Sita's practice is better than that of Lata?	3
Ans	<p>a) Sita is sparing the municipal committee of picking up biodegradable waste and transporting the same to disposal sites.</p> <p>b) Sita is producing her own compost for her home garden. She is not only saving money on purchase of manure and fertilizer but is also practicing organic farming.</p> <p>c) Lata's practice of keeping of keeping two separate bins of bio-degradable and non-biodegradable garbage is most suitable but Sita's practice is better as it reduces the bulk of garbage and saves on money</p>	
22	Define an ecosystem. Explain in detail about its various components. List two each natural and artificial ecosystem.	3

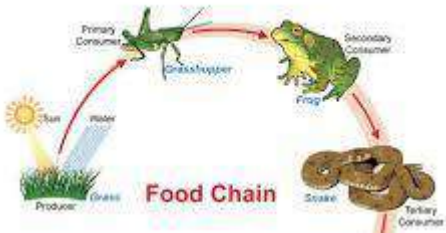
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Ans	<p>Ecosystem is defined as a well-defined unit or area in an environment where biotic and abiotic components interact with each other to maintain balance in nature.</p> <p>Biotic components- producers, consumers, Saprotrophs. Abiotic components- air, water, sunlight.</p> <p>Natural Ecosystem- Pond, Grassland Artificial Ecosystem- Crop field , Aquarium</p>	
23	Differentiate between the food habits of organism belonging to first and second trophic levels.	3
Ans	<p>i)The organism at first trophic level are primary producers which make organic compounds using inorganic inputs like light, water, carbon dioxide etc. eg. plants.</p> <p>ii)The organisms at the second trophic levels are primary consumer. They are herbivores who eat plants (producers) for nutrition. Eg. deer.</p>	
SECTION -D: CASE BASED QUESTIONS: (Q NO: 23- 24)		
24	<p>Read the following and answer the questions any four from (i) to (v)</p> <p>Biosphere is a global ecosystem composed of living organisms and abiotic factors from which they derive energy and nutrients. And ecosystem is defined as structural and functional unit of the biosphere comprising of living and non-living environment that interact by means of food chains and chemical cycles resulting in energy flow, biotic diversity and material cycling to form a stable, self-supporting system</p> <p>I) Which trophic level is incorrectly defined? a) Carnivores – secondary or tertiary consumers b) Decomposers – microbial heterotrophs c) Herbivores – primary consumers d) Omnivores – moulds, yeast and mushrooms</p> <p>II) The diagram below shows a food web from the sea shore The mussel can be described as a) Producer b) Primary consumer c) Secondary consumer d) Decomposer</p> <div style="text-align: center;"> <pre> graph BT GA[green algae] --> MA[microscopic animals] GA --> P[periwinkle] MA --> M[mussel] MA --> B[barnacle] B --> C[crab] B --> DW[dogwhelk] P --> DW P --> DF[dogfish] DW --> DF C --> DF </pre> </div> <p>III) The given figure best represents:</p>	4

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	 <p>a) Grassland food chain b) Parasitic food chain c) Forest food chain d) Aquatic food chain</p> <p>IV) Consider the following statements concerning food chains: (i) Removal of 80% tigers from an area resulted in greatly increased growth of vegetation (ii) Removal of most of the carnivores resulted in an increased population of herbivores. (iii) The length of the food chains is generally limited to 3 – 4 trophic levels due to energy loss (iv) The length of the food chains may vary from 2 to 8 trophic levels Which two of the above statements are correct? a) (i), (iv) b) (i), (ii) c) (ii), (iii) d) (iii), (iv)</p>	
Ans	I) option d- Omnivores – moulds, yeast and mushrooms II) option c-Secondary consumer III) option a- Grassland food chain IV) option c- (ii), (iii)	
25	<p>Presently there is legal ban on running of hazardous industries in residential areas and near schools. The running of such industries in these areas are found causing a lot of sound pollution, air pollution and water pollution. Due to such pollutions the general health of residents is affected by the development of nervous disorders, psychological problems, respiratory diseases etc. The impact of the running of industries are not only limited to human life, but also found have its impact on Natural ecosystems also. We can read that many important species of plants and animals are disappeared in the recent past due to habitat destruction, fragmentation and even due to biomagnification. We know that many industries release hot water to natural water bodies which lead to alteration of the temperature of water, killing many aquatic lives specially fishes.</p> <p>Q 1. Why do you think that the change in temperature of water bodies affect fish life? Q 2. Write few air pollutants released from industries. Q 3. Define Biomagnification. Q 4. Find out and write the statement mentioning the effect of pollution on the general health of residents.</p>	4
Ans	1. The elevated temperature generally decreases the level of dissolved oxygen in the water—typically gases are less soluble in hotter liquids.	

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	<p>2. Carbon monoxide, Lead, Nitrogen oxides etc.</p> <p>3. Biomagnification, is the increasing concentration of a substance, such as a toxic chemical, in the tissues of organisms at successively higher levels in a food chain.</p> <p>4. Due to such pollutions the general health of residents is affected by the development of nervous disorders, psychological problems, respiratory diseases etc.</p>	
	SECTION – E: LONG ANSWER QUESTIONS:(Q NO: 26)	
26	<p>a) How is ozone formed in the outer atmosphere?</p> <p>b) Ozone is being continuously destroyed due to extreme low temperatures. However, ozone formation is also a continuous process, why is there depletion in the ozone layer still?</p> <p>c) How does ozone layer depletion impact human health?</p>	5 (2+2+1)
Ans	<p>a) Ultraviolet radiations split the oxygen molecules present in the stratosphere into free oxygen atoms. These free oxygen atoms then combine with molecular oxygen to form ozone</p> $\text{O}_2 \xrightarrow{\text{UV}} \text{O} + \text{O}$ $\text{O}_2 + \text{O} \xrightarrow{\text{UV}} \text{O}_3$ <p>b) There is still depletion in the ozone layer because the rate of destruction is higher than the rate of formation of ozone molecule</p> <p>c) Removal of Ozone layer allows the harmful UV Radiations to enter and cause diseases like Skin Cancer.</p>	

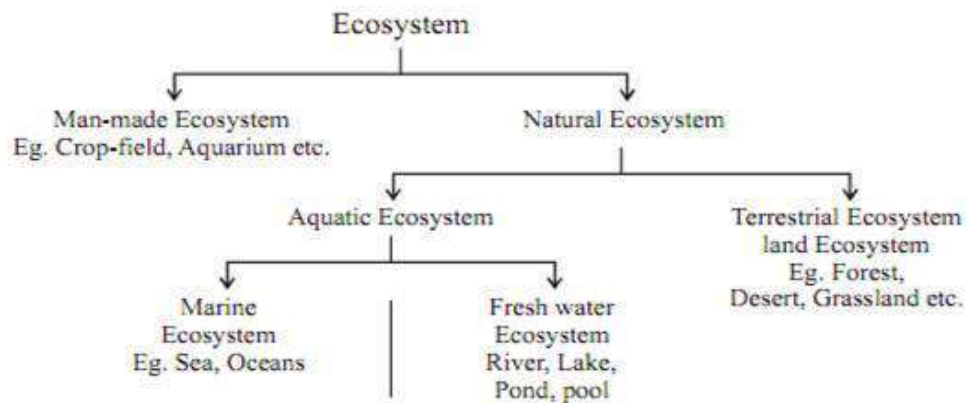
Sl no.	Important Video link
1	https://youtu.be/W6Us1jdXcrI
2	https://youtu.be/SgNLzI03mjM
3	

Sl no.	Short cut Tis/ concept map
1	<p>KEY NOTES/DIAGRAM</p> <p>ECO SYSTEM & ITS COMPONENT</p> <ul style="list-style-type: none"> All the interacting living organisms in an area together with non living components form an ecosystem. So an ecosystem consists of both biotic(living creatures) and abiotic

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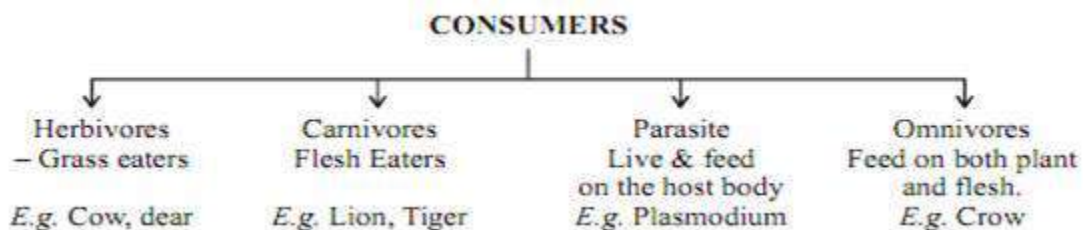
components like temperature, rainfall, wind, soil etc.



- All living organisms are classified on the basis nutrition.

I. **Producers** : All green plants, blue green algae can produce their food (Sugar & starch) from inorganic substance using light energy (Photosynthesis).

II. **Consumers** : Include organisms which depend on the producers either directly or indirectly for their sustenance. Consumers depend on others for food.

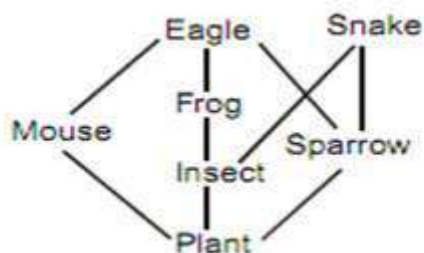


III. **Decomposers** : Fungi & Bacteria which break down(decompose) the dead plant, animals complex compounds into the simpler one. Thus decomposers help in the replenishment for Eg. T_1 T_2 T_3

Grass → *Dear* → *Lion*

A 3- Step Food Chain

- **Food Chain** : It is the sequence of living organisms in which one organism consumes another organism for energy. It is unidirectional(single directional).

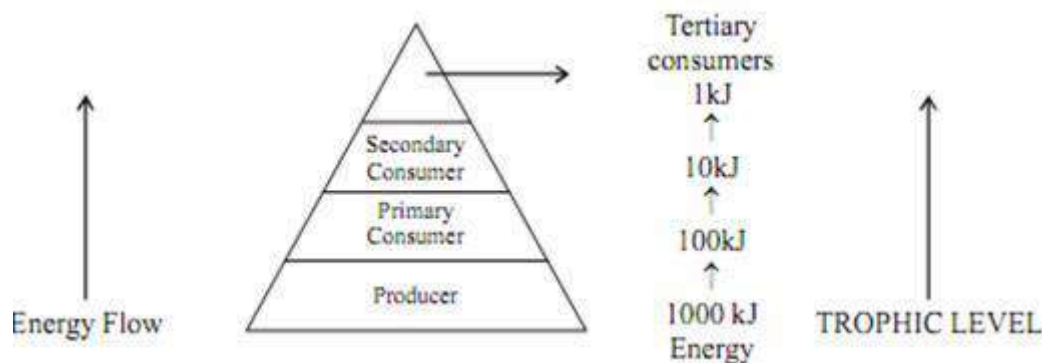


- In a food chain, various steps where transfer of energy takes place is called a trophic level.
- The green plants capture 1% of sun's energy.
- The flow of energy is unidirectional in a food chain.

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- There is gradual decrease in the amount of energy from one trophic level to next trophic level in a food chain.



- **10 Percent Law** : The energy available at each successive trophic level is 10% of the previous level.

So only 10% of Energy is transferred to next trophic level while 90% of energy is used by present trophic level in its life processes.

- The concentration of harmful chemical increases with every next trophic level in a food chain. It is called Bio-magnification
- Maximum concentration of such chemicals get accumulated in human bodies. Since humans occupy the top level in any food chain.

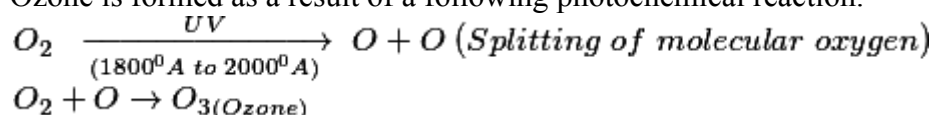
ENVIRONMENTAL PROBLEMS

- Changes in environment affect us and our activities change the environment around us. Environmental problems caused by humans:

- (a) depletion of the Ozone Layer and waste disposal.
- (b) pollution due to mismanagement of waste disposal.

I. Depletion of Ozone Layer

- (O₃) layer is largely found in the stratosphere which is a part of our atmosphere from 12 km – 50 km above sea level.
- Ozone is a deadly poison at the ground level.
- Ozone is formed as a result of a following photochemical reaction.



- Ozone layer is a protective blanket around earth which absorbs most of the harmful U.V. (Ultraviolet) radiation of the Sun, thus protecting the living beings of the earth from health hazards like skin cancer, cataract in eyes, weaken immune system, destruction of plants etc.
- The decline of Ozone layer thickness in Antarctica was first observed in 1985 and was termed as **OZONE HOLE**.

Reason of Ozone Depletion

Excessive use of CFCs (Chloro Fluoro Carbon) a synthetic, inert chemical E.g. Freon which are used as refrigerants and in fire extinguishers, caused Ozone depletion in the upper atmosphere. A single chlorine atom can destroy 1,00,000 Ozone molecules. U.N.E.P. (United Nation Environment Programme) did an excellent job in forging an agreement to freeze CFC production at 1986 levels (KYOTO Protocol) by all countries.

Garbage Disposal

Industrialization and rise in demand of consumer goods have created a major problem in the form of wastes/garbage accumulation and its disposal specially in urban area.

The different methods of solid wastes disposal commonly used around

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	<p>the world are.</p> <ol style="list-style-type: none">1. Open dumping : A conventional method in which solid wastes dumped in selected areas of a town. It actually cause pollution2. Land fillings : Wastes are dumped in low living area and are compacted by rolling with bulldozers3. Composting : Organic wastes are filled into a compost pit (2m × 1m× 1m). It is then covered with a thin layer of soil. After about three months the same garbage filled inside the pit changes into organic manure.4. Recycling : The solid wastes is broken down into its constituent simpler materials. These materials are then used to make new items. Even non-bio degradable solid wastes like plastic, metal can be recycled.5. Reuse : A very simple conventional technique of using an item again& again. For e.g. paper can be reused for making envelops etc.
2	
3	