GENERAL SCIENCE 8

CONTENTS

UNIT 1
ECOLOGY

1. MCQs (Choose the correct options)

1. The process which consumes carbon dioxide and produce oxygen is.

a. Respiration b. Combustion
c. Photosynthesis✓ d. Fossilization

2. Greenhouse gases.

a. burn to add heat b. Trap heat✓
c. Help heat escape d. Do not allow heat to each surface

3. The intersection in which both members get benefit from each other is

a. Mutualism✓ b. Predation
c. Commensalim d.Competition

4. The organism that kills the other for food is called

a. Prey b. Parasite
c. Pathogen d. Predator✓

5. Rhizobium is a group of bacteria which live in the roots of some plants. They fix nitrogen for plant and get food in return. This relationship is.

a. Parasitism b. Commensalism
c. Mutualism✓ d. competition

6. In a food chain, which type of organism utilizes most of the sun energy coming to earth?

a. Producers✓ b. Primary consumers
c. Secondary Consumers
d. Tertiary consumers

7. In an ecosystem, the energy flow is always.

a. Bidirectional b. Random
c. Down in pyramid d. Unidirectional✓

8. Carnivorous plants feed insects because these plants grow on marshy places deficient in.

a. Carbon b. Nitrogen✓
c. Calcium d. Iron

9. Greenhouse traps

a. Carbon dioxide b. Heat✓
c. Light d. Water

10. The most common non-biodegradable pollutants is

a. Wood b. Leaf litter
c. Bodies of dead animals d. Plastic✓

B. Short Question

Q1. What are the main causes of pollution?

Ans. Major causes of pollution are::;

- Harmful gases and dust from factories.
- Pollutants from power stations and automobiles.
- Sewage from urban areas.
- Use of plastics.

Q2. Differentiate between primary and secondary consumers

Primary Consumers	Secondary Consumers
1. The organisms that feed on primary produces (Plants)	The organisms that feeds on primary consumers
2.They are generally herbivores	They are commonly called primary carnivores
3. Examples Cow , Grasshopper Zooplankton etc	Examples Birds, Fishes and wolf etc.

Q3. What is mutualism? Give some examples?

Ans. **Mutualism:**

Mutualism is the type of relationship in which two organisms of different species works together and all species involved get benefit from their interactions.

Example

- Honey Guide and humans
- Coral and algae
- Clownfish and anemanses etc

Q4. Enlist the ways to control air pollution?

Ans. Air pollution can be controlled by two fundamentals ways

1. Preventive technique:

- It includes use of devices for removals of pollutants from exhaust gases e.g. scrubbers, dry and wet collectors, filters, electrostatic precipitations etc.
- Building of higher stake facility for discharging of pollution into air.

2. Effluents controls:

- Substitution if raw materials causing more pollutions with that of less pollution causing materials.
- Use of non-conventional fuel like Gobar gas, Biogas , LPG etc.

Q5. Why sewage water must be treated before releasing it into streams?

Ans. As sewage water contains harmful substances. It is a complex mixture containing suspended solids, organic and inorganic impurities, nutrients, disease causing bacteria and other microbes. So, sewage water should

be treated before releasing it into streams so that it does not causes further pollution of water source.

Q6. How can you grow plants of warm area in a region with low environmental temperature?

Ans. In order to grow plants of warm area in a region with low environmental temperature, we have to build or arrange a space with green house effect and we can do this by covering the plantation area with plastic sheet.

C. Long Questions

1. Explain carbon cycle and find the reasons for gradual increase of carbon dioxide in atmosphere?

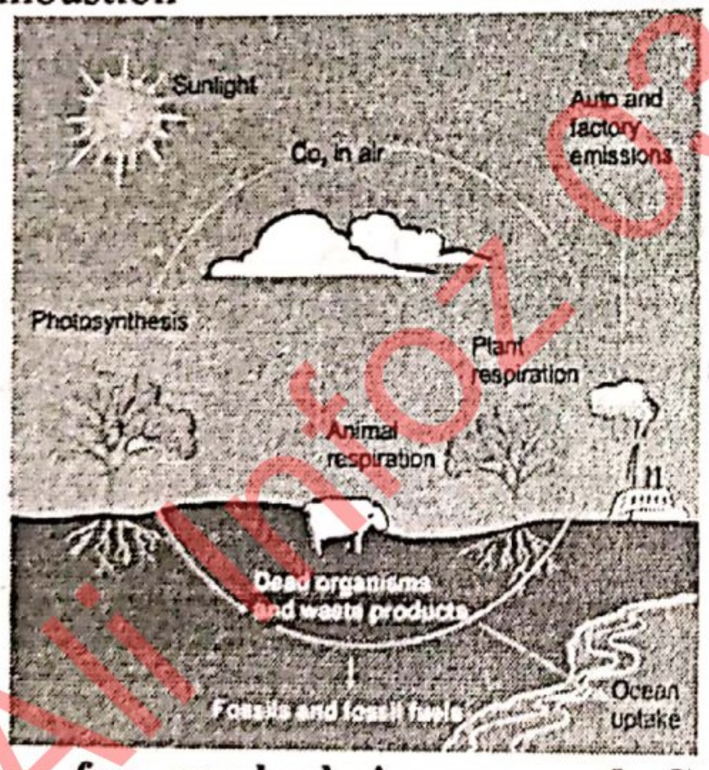
Ans Carbon cycle:

The rapid exchange of Carbon among living things and atmosphere is called Carbon cycle.

Steps of Carbon cycle:

The four steps of Carbon cycle are given below;

1. Photosynthesis
2. Decomposition
3. Respiration
4. Combustion



Reason for gradual increase of Carbon dioxide.

The following reasons for gradual increase of Carbon dioxide are given below;

1. Combustion of fossils fuels
2. Cutting down of trees
3. Over population
4. Increase in use of automobiles etc
5. Increase in number of industries etc.
6. Death and decay of organic matters.

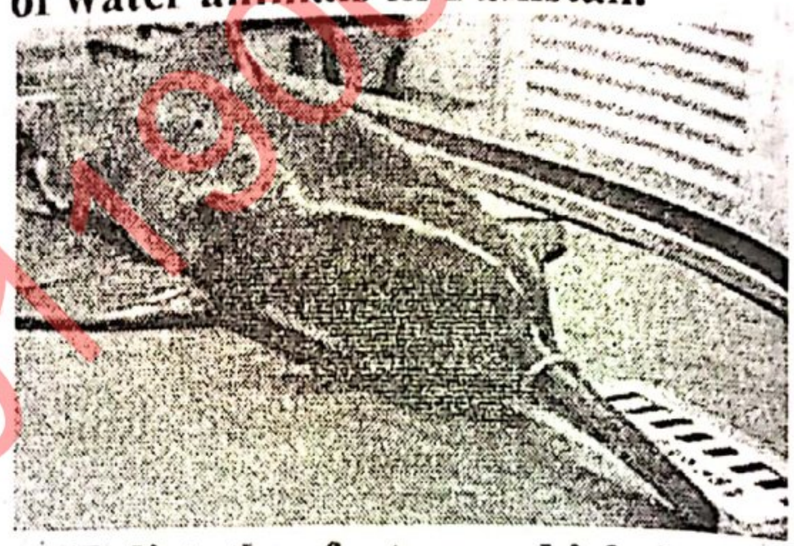
Q2. How positive activities of human can help to restore an ecosystem?

Ans. The following are the positive activities of human that can help to restore an ecosystem;

- Reforestation
- Afforestation
- Reduce tillage
- Use of natural fertilizers
- Growing more diverse crops
- Less use of pest control chemicals
- Recycling
- Establishing wildlife preserves and parks
- Control pollution.
- Creating green, open space laws
- Creating environmental regulations.
- Environmental protection laws

D. Structured Questions

1. Blind Indus dolphin is endemic to river Indus. It is an endangered species of water animals in Pakistan.



a. Enlist the factors which lead to the thread of extinction of Indus dolphin?

Ans. The factors which lead to the threat of extinction of Indus dolphin are;

- Entanglement
- Habitat degradation
- Noise
- Chemical contaminants and vessels

b. What is the present status of this mammal?

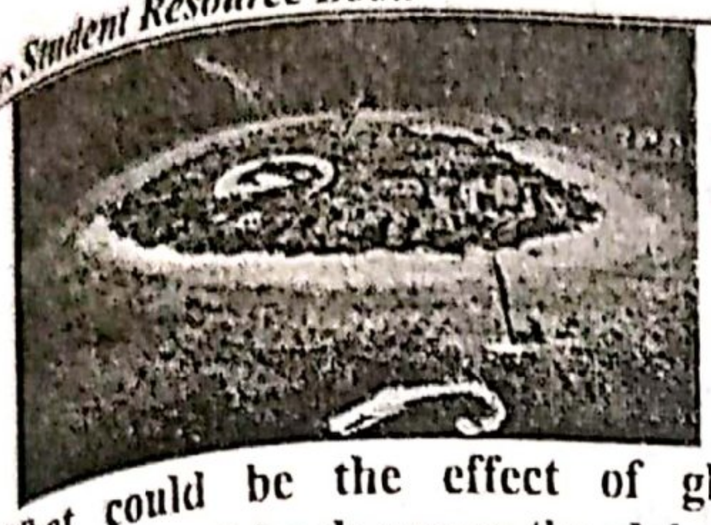
Ans. The present status of this dolphin mammal is endangered because of human activities.

c. Suggest the steps to help conservation of Indus dolphin?

Ans.. The steps to help conservation of Indus dolphin are given below.

- There should be complete ban on hunting of Indus dolphin.
- Breeding places should be protected provided with all necessities.
- The water pollution should be avoided especially in this region.

2. Most of the islands of Maldives are less than one meter above the sea level:



2. What could be the effect of global warming in such islands across the globe?

Ans. The effect of global warming on such islands across the globe is that it increases frequency of extreme weather events such as heavy rainfall during the summer season and less rainfall during the winter season.

B. Suggest the ways to save coastal cities from flooding or being submerged?

Ans. The coastal cities can be save from flooding or being submerged by the following strategies.

- Rainwater harvesting
- Permeable pavement
- Green roofs
- Hard engineering strategies (building man made structures such as sea walls)
- Soft engineering strategies (using natural processes such as beach nourishment.

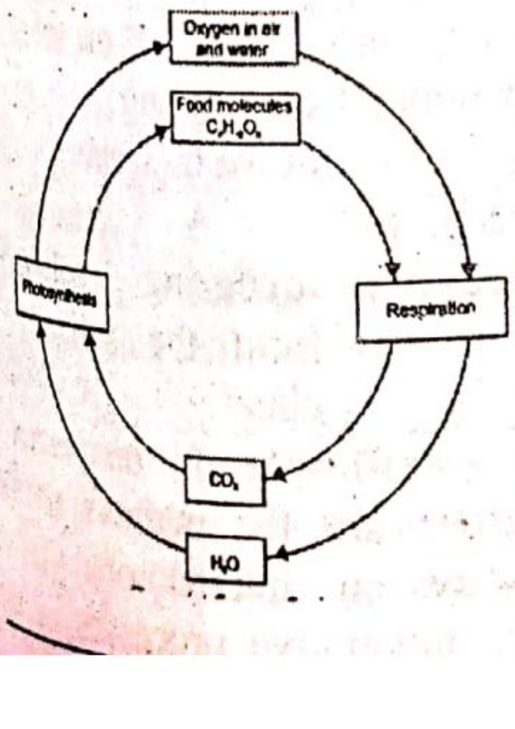
Stop and check

A drastic change in the level of either of these gases represents serious threat to life. What will happen if the level of carbon dioxide continues to increases?

Ans. If level of CO_2 continues to increase than more heat wire will be trapped by atmosphere as it is one of green house gases. It will absorb more heat and will result in global warming. Since few decades global warming is observed on considerable rate.

Additional Questions

1. Draw oxygen cycle?



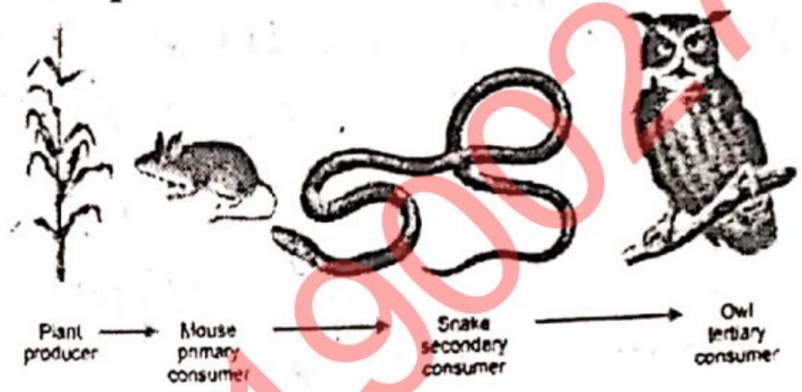
2. How the concentrations of CO_2 remain constant in air?

Ans. CO_2 is almost 0.03 Percent in air. It is constantly removed by autotrophs through photosynthesis. The concentration of CO_2 in the air remain constant in air because it is produces in respiration by all living organism.

3. Define Food chain?

Ans. A food chain is a series of organisms through which energy is transferred in the form of food.

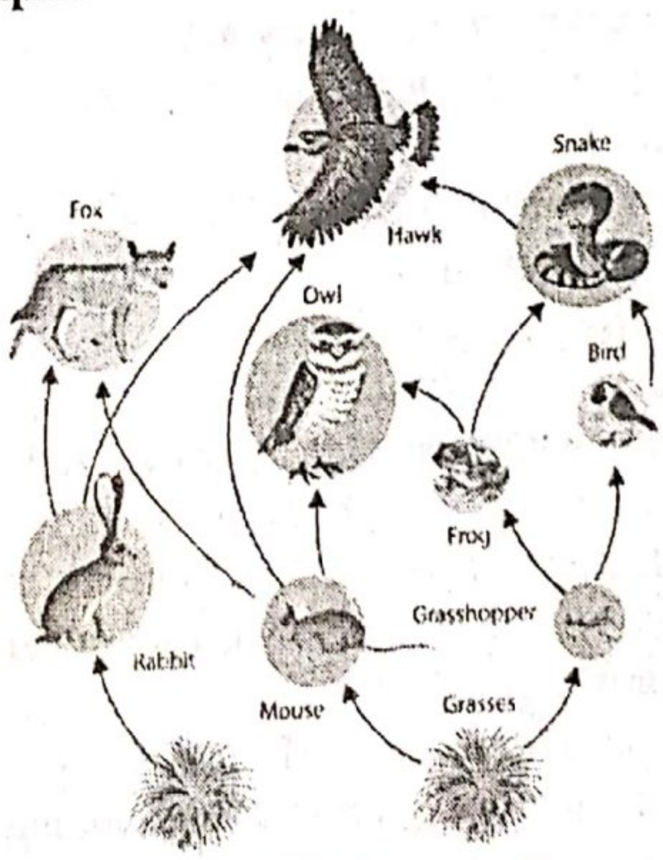
Example:



4. Define Food Web?

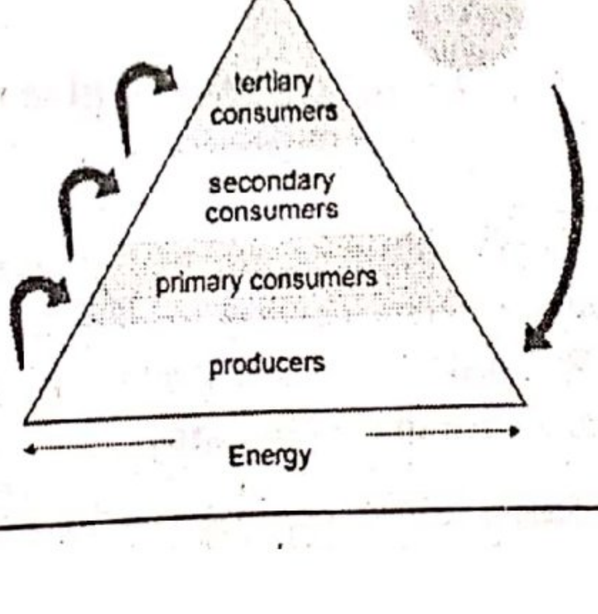
Ans. A network of interconnecting food chains in a natural community of different organism is called food web

Example:



5. Explain pyramids of energy?

Ans. The total energy in the various levels of a food chain can be represented in a form of a pyramid. This is called pyramid of energy.



UNIT 2
HUMAN NERVOUS SYSTEM

A. MCQs(Choose the correct option)

1. The basic unit of structure and function of nervous system is .

a. Nerve b. Brain
c. Neuron✓ d. Spinal cord

2. Which of the following is not part of forebrain?

a. Cerebellum✓ b. Cerebrum
c. Thalamus d. Hypothalamus

3. Withdrawal of hand on touching hot object is an example of:

a. Reflex action✓ b. reflex arc
c. Voluntary action d. Conscious activity

4. Everything you do is controlled by:

a. Respiratory system b. Circulatory system
c. Digestive system d. Nervous system✓

5. Nervous system is made up of:

a. Brain, spinal cord, and heart.
b. Brain, spinal cord and blood vessels
c. Nerves, arteries and veins
d. Brain, spinal cord and nerves✓

6. Neuron cell fibres which conduct nerve impulses toward cell body are.

a. axons b. Dendrites✓
c. myelin shet d. Nerve

7. Brain stem includes all Except.

a. Medullah oblongata
b. Midbrain c. Cerebellum✓
d. Pons

8. Which is the largest part of brain?

a. Brain stem b. Hypothalamus
c, Thalamus d. Cerebrum✓

9. Which part of the brain keeps you breathing?

a. Cerebrum b. Thalamus
c. Hypothalamus d. Medulla oblongata✓

10. Which part of the nervous system will help you to keep balance while riding a bicycle?

a. Spinal cord b. Pons
c. Cerebellum✓ d. Cerebrum

B. short Questions

1. Name three types of neuron and give their function?

Ans. **Definition:**

A neuron is the basic structure and functional unit of nervous system.

Types of Neuron: On the basis of their functions neuron are the three types.

a. Sensory Neuron: Sensory neuron carry nerve impulse from sense organs to the central nervous system.

Example: Ear, Eyes, Skin, Tongue, Nose etc.

b. Motor Neuron: Motor neuron takes impulses away from central nervous system to effectors.

Example: Muscles and glands

c. Associative/Inter Neuron

Associative neurons present in the central nervous system, link the sensory and motor neurons.

Functions: They analyze the message for the proper response.

Q2. Which receptors and effectors are involved in the reflex actions of:

(a) Blinking of eyes in light spark.

Receptor: Photo receptor
Effectors: Eye lids.

(b) Withdrawal of hand on touching hot object.

Receptor: Sensory nervous
Effectors: Muscles of arms

Q3. What is the significance of Peripheral nervous system?

Ans. As we know that peripheral nervous system consists of spinal cord and neurons i.e. sensory, motor and interneuron. Sensory neurons receive stimulus and carry it. Interneuron, interpret these stimuli and motor neurons carry response to the effectors, thus peripheral nervous system perform the important functions in our body.

Q.4 Differentiate between receptors and effectors?

Receptors	Effectors
Receptors detect the stimuli and converts it into an impulse	An effectors converts the impulse into an action
Example:	Example:
- Chemoreceptor detect the presence of chemicals	- A muscles contracting to move the arms
- Thermoreceptors detect changes in temperature	- A muscle squeezing saliva from the salivary gland.

Q5. What is the significance of interneuron?

Ans. Interneurons are the neurons of the central nervous system. Interneurons play a vital role in the integrative processes of the

nervous system. In reflexes, they coordinate the response of motor neurons necessary to address a stimulus. Additionally, these are responsible for communicating with the brain of cognition.

C. Long Questions

Q1. Give the structure of human brain roles of different parts of brain?

Ans. **Brain:**

Cranium: The human brain is enclosed in a bony case called the cranium.

Weight: An adult human brains weight s about three pounds.

Composition: The brain consist of billions of neurons.

Meanings: Three layers of connective tissues called meanings and the fluid presents in these layers protect the brain.

Parts:

The brain can be divided into three main parts

a. Fore brain
b. Mid brain
c. Hind brain

(a)Forebrain:

Forebrain is the largest part of the brain.

Parts:

It consists of three main parts

- Cerebrum
- Thalamus
- Hypothalamus

Cerebrum: Cerebrum is the top most and the largest part of the brain.

Division:

It is divided into;

Right cerebral hemisphere:

Right cerebral hemisphere control movements and activities of the left side of the body.

Left cerebral hemisphere:

Left cerebral hemisphere control the left side of the body.

Functions of cerebrum:

Cerebrum is the control centre many sensory areas. Like sight, speech, smell, taste, and hearing. It also concerned with learning, thinking, intelligent memory and voluntary movements.

Thalamus: Inside the cerebrum, there is a small structure called thalamus.

Functions: It acts as a processing centre between the body and these cerebrum by receiving sensory information like touch and sound carrying them to the cerebrum.

Hypothalamus: At the base of thalamus is the hypothalamus.

Functions: It regulates body temperature, hunger and thirst.

(b) Mid Brain: It is the centre part of the brain.

Functions.

i. Its basic functions are to transfer information and impulses between the forebrain and hind brain.
ii. This part of brain is associated with vision, hearing, sleep, wake and temperature regulation.
iii. The mid brain also serves to centre some reflexes such as changing size of the pupil to control the amount of light entering the eye.

(c) Hind brain:

Parts:

The hind brain consists of three parts i.e.

- Cerebellum
- Pons
- Medulla oblongata

Cerebrum: Cerebellum is the second largest part of the brain

Functions: It is mainly concerned with posture, balance, and locomotion of the body.

Pons:

Structure: Pons is the smallest ova structure present above the medulla oblongata.

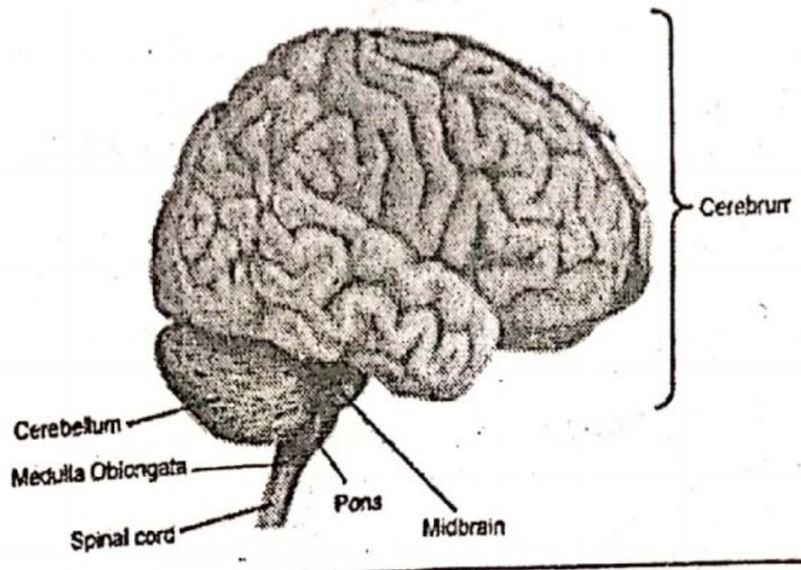
Importance: It serves as a bridge for the conduction of impulses between the cerebrum, medulla oblongata and the cerebellum.

Function: It concerned with the rate of breathing, sleeping and also regulate eye movement and facial expression.

Medulla oblongata: Medulla oblongata connects the brain to the spinal cord.

Functions: It controls heart beat, swallowing vomiting, coughing, sneezing, digestion and breathing etc.

Importance: Medulla oblongata keeps on working when the rest of brain doesn't work.



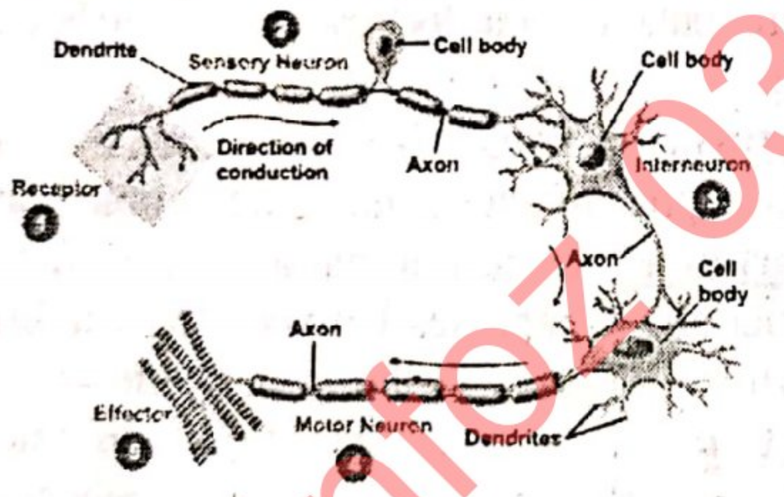
Q2. Differentiate between reflex arc, and reflex action and explain the pathway followed by nerve impulse in a reflex arc.

Reflex arc	Reflex action
The nerve pathway by a reflex action travels from receptors to the effectors is called reflex arc.	The involuntary rapid action under the control of spinal cord is called reflex action.
Example	**Example**
Pain receptors in the fingers tips.	With drawl of hand on touching hot object.

Pathway followed by nerve impulse in a reflex arc.

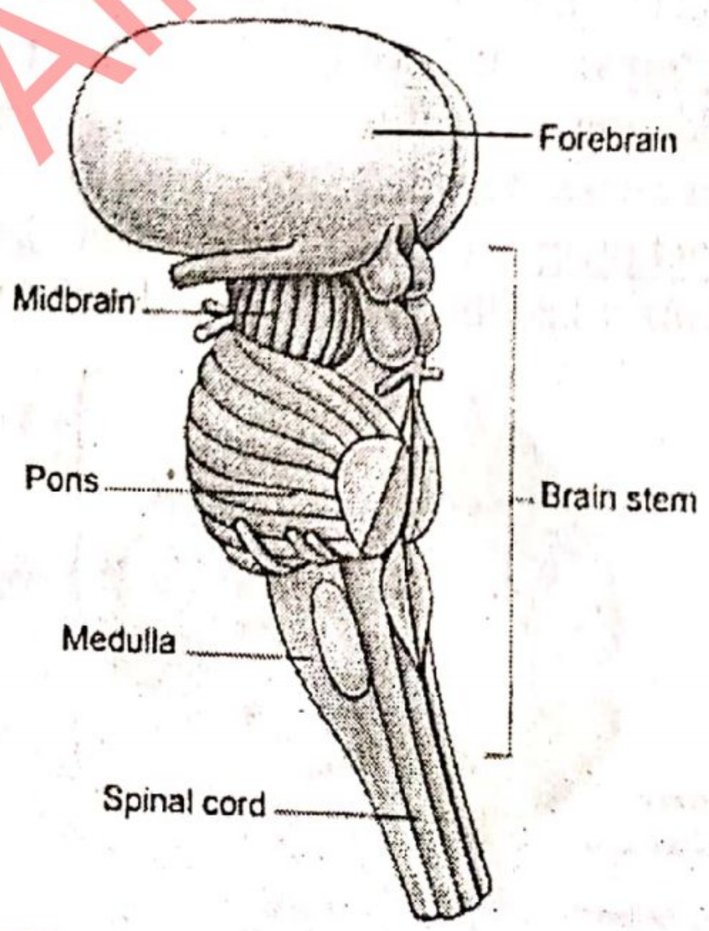
Reflex arc is a pathway on which nerve impulse travels from receptors to the effectors the sequence of pathway of nerve impulse in reflex arc is as under

1. Sense organ (Receptor)
2. Sensory neuron
3. Interneuron (In CNS)
4. Motor neuron.
5. Effector (Muscle or gland)



D. Structure questions

1. Medulla oblongata, pons and mid brain collectively form brain stem



a. Look at the functions controlled by these parts and suggest what will happen by these parts and suggest what will happen of brain stem dies?

Ans. Brain stem plays important role in function of body. As without stem no plant can exist.

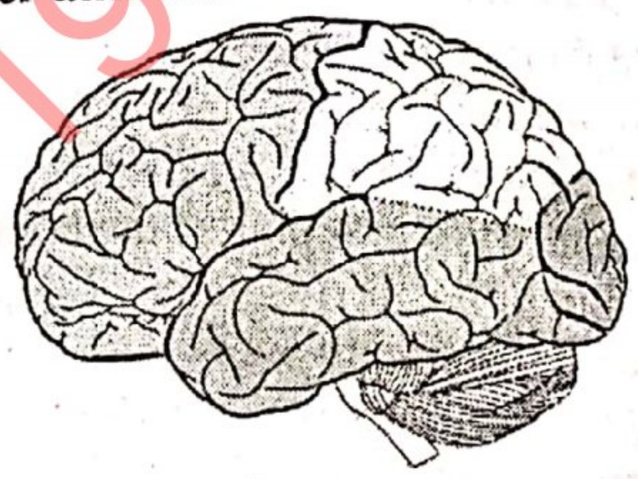
Similarly, without brain stem, brain can't work in any way. So death of brain stem will cause unconsciousness and even to goes to death.

b. What will happen if connection between cerebellum and brain stem is damaged in an accident?

Ans. If connection between cerebellum and brain stem is damaged in an accident, their messages from spinal cord or cerebellum can't be sent and processing of messages can't be done.

So body will not function properly.

2. Human have the largest cerebrum than any other animal?



a. Why is it so much convoluted?

Ans. It is much convoluted because these convolution allow a large surface area of brain to fit inside our skull.

b. Give the advantages of having large cerebrum?

Ans. Large cerebrum has better cognitive performance and store a lot of information.

c. Enlist the roles of cerebrum

Ans. Cerebrum is the site of conscious memory, intelligence, learning reasoning, personality, emotion and will.

Stop and check

What will happen if pleasure centre of a person is suppressed?

Ans. If the pleasure centre of a person is suppressed then it will cause emotional disorders and active Para sympatric sense.

Try it yourself

Here are some activities you perform in routine.

Walking, sneezing, running, riding, a bicycle, breathing, eating, reading, hearth

beat, swimming, blinking of eyes and salivation.

a. Which if these activities are voluntary in nature?

Ans. Walking, running , Ridding a bicycle, Eating , Reading, swimming.

b. Which of these activities are involuntary in nature?

Ans. Sneezing, Breathing, Heart beat, Blinking of eyes, salivation.

c. Enlist some our other voluntary and involuntary activities which you have experienced

Ans. **Voluntary activities:**

- Raising of hands
- Talking
- Jumping
- Skipping
- Playing games etc.

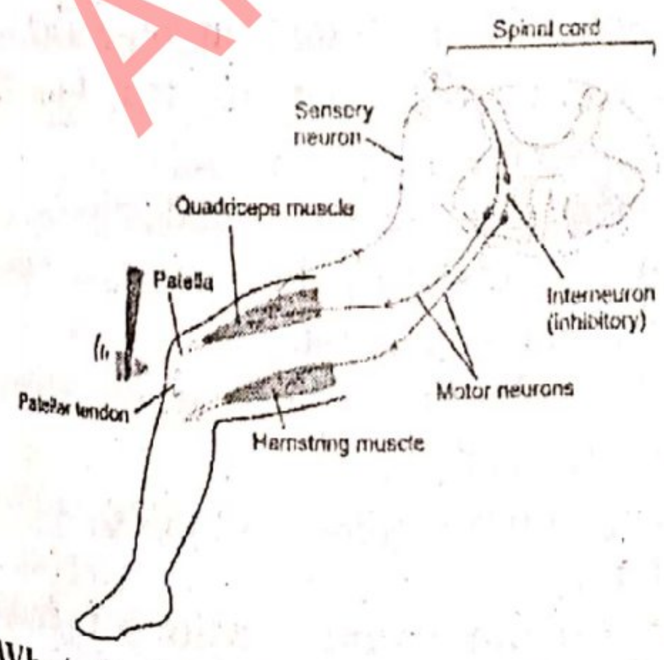
Involuntary activities:

- Pumping of heart
- Yawning
- Functions of internal organs

Activity 2.2

The knee Jerk reflex

Sit down and cross your legs on such a way that the shin of your upper leg can swing freely. Give a sharp tap just below the kneecap with the edge of your hand what happen.



a. What feeling do you get in you tight muscles?

Ans. I felt contraction in thing muscles due to which I felt a jerk in my knee.

b. Is the Kicking of your leg an automatic reaction?

Ans. No, the kicking of my leg is not an automatic reaction but it is a voluntary reaction.

c. Can you control it?

Ans. Yes, the kicking if my leg is a controlled reaction and I can control it.

Additional Question

1. Define stimulus?

Ans. Any change in environment which has some influence on living organism is called stimulus.

2. Define effectors?

Ans. Sense organs or cells which receives stimulus are called receptors
e.g eyes, nose etc.

3. Define effectors?

Ans. A muscles, gland or organ capable of responding to stimulus is called effectors.

4. Define response?

Ans. The change in activity of the organism according to the stimulus is called response.

5. Draw a flow chart of working of nervous system?

Ans. Stimulus → Sensory neuron → Central Nervous system → Motor Neuron → Effectors → Response

6. What are the numbers of cranial nerves?

Ans. The nerves originates from the brain are cranial nerves. There are 12 pairs of cranial nerves in Human.

7. What are the numbers of spinal nerves?

Ans. The nerves originates from the spinal cord are called spinal nerves. There are 31 pairs of spinal nerves in humans.

8. What happens if neuron is suffered from an accident or injury?

Ans. Neuron can be damaged by pressure, stretching or cuttings. An injury to a neuron can stop signals transmitted to and from the brain.
Symptoms of damage to nerves include;

- Loss of movement
- Loss of sensation
- Pain or stinging sensation
- Difficult breathing

Additional MCQs

1. The human brain is enclosed in a bony case called _____

a. Cerebellum b. Thalamus
c. Cranicum✓ d. Hypothalamus

2. The part of brain responsible for voluntary actions is _____
a. Medulla b. Cerebellum
c. Cerebrum✓ d. Spinal cord
3. An adult human brain weights about _____ pounds.
a. Three✓ b. Two c. Four d. one
4. Three layers of connective tissues called_____ present in brain
a. Medulla b. Corebrum
c. Menings✓ d. Cerebellum
5. _____ Regulates body temperature, hunger and thirst.
a. Thalamus b. hypothalamus✓
c. Cerebrum d. Cerebellum
6. The peripheral nervous system consist of _____ cranial nerves.
a. 12 Pairs✓ b. 10 pairs
c. 11 pairs d. 9 Pairs
7. Fatty substances covering the axon, form_____
a. Pons b. Myelin✓
c. Cranium d. Hypothalamus
8. Any change in the environment that can be detected by a receptor to initiate a nerves impulse is called
a. Stimulus✓ b. Discouragement
c. Paraysis d. Inhibition
9. Reflex actions occur with the help of.
a. Spinal Cord✓ b. Heart
c. Kidney d. Pancreas
10. The part of neuron that receives messages are
a. Cell bodies b. Dendrites✓
c. Axon d. Nuclei.

UNIT 3
VARIATIONS, HEREDITY AND CELL DIVISION

A. MCQs (Choose the correct option)
1. Which of the following is a continuous variations in humans?
á. Tongue rolling b. ABO Blood groups
c. Intelligence✓ d. Free or attached ear lobe
2. The chromosomes are chemically composed of:
a. DNA and carbohydrates
b. DNA and proteins✓
c. Proteins and lipids d. DNA and lipids
3. The analysis of a DNA Molecule shows 30% adenine nucleotide. The amount of guanine nucleotide in this molecule will be.
a. 10% b. 20%
c. 30%✓ d.40%
4. Which of the following is not component of a nucleotide?
a. Gene✓ b. phosphate group
c. Deoxyribose d. Nitrogenous base
5. Which of the following makes a difference of meiosis from mitosis?
a. The appearance of chromosomes in prophase. b. Crossing over✓
c. Spindle formation d. Cytokinesis
6. For each biological trait there is a.
a. Nucleotide b. Chromosomes
c. Cell d. Gene✓
7. All of the following involve mitosis Except.
a. Gamete formation✓ b. Healing of wounds
c. growth d. Development
8. In the constantly changing environment, the survival of species depends on
a. Less number of genes
b. Small population size
c. More variations✓
d. More competition
9. A Gamete of pea plant has seven chromosomes. What will be the number of chromosomes in each cell adult plant if it is diploid organism?
a. 07 b.14✓
c. 21 d. 28
10. The pairing of chromosomes takes place during.
a. Prophase of mitosis b. Anaphase of mitosis
c. prophase I of meiosis✓
d. Prophase II meiosis

B. Short Questions?
Q1. Why is meiosis important in organism that reproduces sexually?
Ans. Meiosis is important in organism that reproduces sexually due to the following reason.
1. It is essential for sexual reproduction.
2. It keep the number of chromosomes constant from generation to generation.
3. Meiosis help to create genetic variations among the offspring's.
4. Meiosis allows a species to bring variations for adaptations.
Q2. State the important of Mitosis in human life?
Ans. The important role of Mitosis in human life is as following.
a. Growth.

New cells are produced by mitosis in multicellular organism to grow.

b. Repair.

Mitosis is responsible for healing of wounds and repair of warn out parts.

c. blood Formation.

Mitosis division is also responsible for increase the number of blood cells.

d. Hair and Nails.

Hair and nail growth also take places because of mitosis.

Q3. What is significance of spindle fibre in cell division?

Ans. Spindle fibres form a protein structure that divides the genetic material in a cell. The spindle is necessary to equally divide the chromosomes in a parental cell into two daughter cells during both types of nuclear division (mitosis and meiosis)

Q4. You never see frogs. Snakes and lizards during extreme winter as thy hibernate. What type of adaptation is it? Explain?

Ans. We never see frogs, snakes and lizards during extreme winter as they hibernate. They show behavioural adaptation. As we know that a behavioural adaptation is a behaviour that helps an organism to survive and/or reproduce in its environment.

C. Long Questions

Q1. What are variations? Give different causes of variations?

Ans. **Variations:** The difference among the members of the same species is called variations.

Causes: Main causes of variations are the following.

a. Crossing over b. Mutation

c. Environmental factors

A. Crossing over: The exchange of parts of homologous chromosomes during meiosis is called crossing over. That results in more than two parental types of chromosomes in gametes.

b. Mutation: Sudden heritable change in the nucleotide sequence of DNA is called mutation. It produces different types of alleles.

c. Environmental factors:

Environmental factors which causes variations includes

- Diet
- Temperature
- Humidity

Q2. Describe the process of mitosis in detail?

Ans. **Mitosis:**

Mitosis or somatic cell divisions a type of cell division in which a parent cell is divided into two daughter cell having same number of chromosomes.

Stages:

The process of mitosis can be divided into two main stages.

A. karyokinesis

b. CytoKinesis

A. Karyokinesus:

Karyon = Nucleus

Kin esis = Movement/ Division

Definitions:

The division of nucleus is called Karyokinesis.

Phase:

1. Prophase
2. Metaphase
3. Anaphase
4. Telophase

Explanation:

(1) Prophase:

It is the first stage of Karyokinesis.

Event:

Following events takes place during prophase.

1. Chromatins condense to form the chromosomes having two chromatids each. At this stage the chromosomes become visible.
2. Centriole start moving tO opposite poles.
3. Nuclear membrane and nuclei becomes to disappear.
4. Spindle fibre formation starts at this stage.

2. Metaphase:

It is the second stage of mitosis.

Event:

Following events take place during this stage.

1. Spindle fibres attach with chromosomes two fibres from both attach with one chromosome.
2. The chromosomes arrange themselves at the equator of the cell to form the metaphase plate.

3. Anaphase:

It is the third phase of the mitosis

Event:

Following events takes place during Anaphase.

1. The centromere of each chromosomes splits.
2. Spindle fibre pulls the chromatids apart to opposite poles.
3. Once separated they are called daughter chromosomes.

4. In late anaphase, the chromosomes have almost reached to the respected poles.
5. The cell membrane start to move inward.

4. Telophase:

It is the last stage of Karyokinesis

Event:

Following events takes place during telophase.

1. Spindle fibres break down
2. Nuclear membrane and nuclei disappear.
3. Two daughter nuclei are formed having same number of chromosomes as that of parent cell.
4. Chromosomes becomes uncoil to becomes thin chromatin network.

B. Cytokinesis:

Word Meaning

Cyto = Cytoplasm/cell
Kineins = Splitting

Definition:

The Division of cytoplasm is called cytokinesis.

Events.

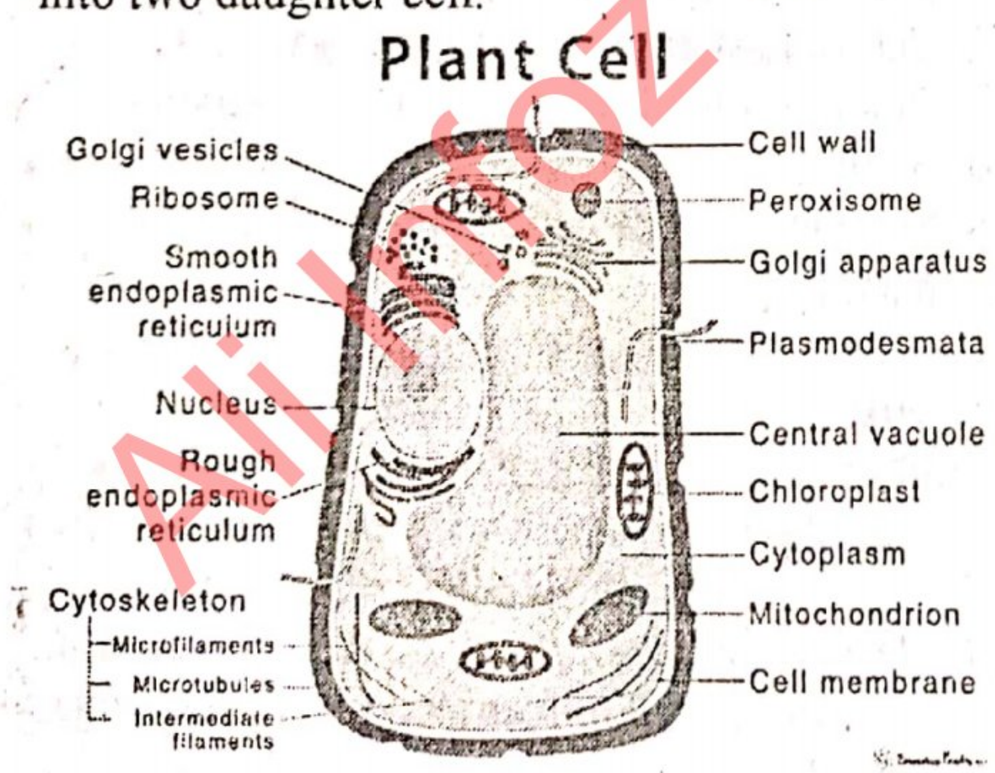
Important events of cytokinesis are following.

1. In animals:

In animal cell cleavage furrows appears in the cytoplasm between the two nuclei. That deepens to from two identical daughter

2. In Plant cell:

In plant cell, a cell plate is formed between the two daughter nuclei that finally divides the cell into two daughter cell.



D. Structured Questions

1. Look at the coloured spiral structure of DNA

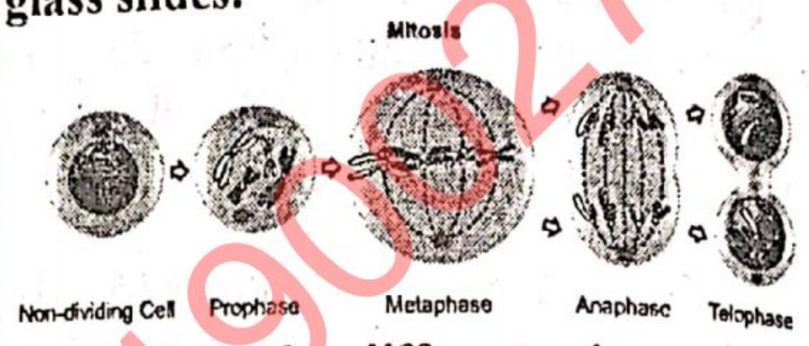
(i). Shows units of DNA molecule in different colours

Adenine: White
Guanine: Green
Cytosine: Orange
Thymine: Blue

(ii). Explain how these units pairs to form DNA molecule.

Ans. Genetic information is carried in the linear sequence of nucleotide in DNA. Each molecule of DNA is double helix formed from two complementary strands of nucleotide held together by hydrogen bonds between Guanine with Cytosine and Adenine with Thyamine base pair.

2. Observe the stages of mitosis under the microscope through prepared permanent glass slides.



1. Explain the difference in appearance of chromosomes at prophase and telophase stage?

Ans. **Prophase stage:**

DNA is coiled up tightly so chromosomes become visible as DNA is already replicated. Each chromosome has two chromatids attached at centromere.

Telophase stage:

Chromosomes uncoil and disappear.

2. Why chromosomes are not visible in non-dividing cell?

Ans. Chromosomes are not visible in non-dividing cell because chromosomes exist as chromatin, which are loose uncoiled strand that are not visible, chromatic is condensed to chromosomes.

Stop and check

Have your had such a fascinating experience that a stranger had recognized whose child you are or whose sibling you are? How was he able to make such an accurate guess? Share your experience?

Ans. If a stranger recognized us and make a accurate guess about our siblings and our parents by our facial features as our genes comes form the same sources so, we resembled to our siblings.

Activity 3.1

DNA Extraction

Material Required

- One piece of some soft fruit(Banana or strawberry)
- Water (30ml)
- Chilled isopropyl alcohol(30 ml)
- Dish soap (2 drops)
- Table salt (1 pinch)
- Cloth filter
- Elastic band
- Two glass jars
- Spoon

Procedure

i. Put one inch piece of banana in a glass jar and mash it by using clean spoon
ii. Add 30 ml of water and pinch of table salt. Continue to mash for another 2-3 minutes.
iii. Secure the cloth filter over the opening of other jar using an elastic band.
iv. Pour the mashed fruit mixture through filter.
v. After filtration is complete, remove the filter and discard it keep the liquid part in jar.
vi. Add two drops soap to the liquid in jar and gently swiri the liquid without making bubbles.
vii. Tilt the jar and slowly pour30 ml isopropyl alcohol so that it gently runs down and forms a layer over the top of fruit mixture.
viii. Let the solution sit for few minutes.
ix. You will see some white fluffy strands begin to appear at the boundary between fruit solution and alcohol. That is DNA.

Additional Questions

Q1. Define heredity?

Ans. The passing on of physical or mental characteristics genetically from one generation to another

Or

Heredity is the sum of all biological processes by which particular characteristic are transmitted from parents to their offspring's.

Q2. How would you differentiate between mitosis and meiosis?

Mitosis	Meiosis
1. Mitosis involves one cell division	Meiosis involves two successive cell division.
2. Mitosis results in two daughter cells	Meiosis results in four daughter cells
3. Number of chromosomes in mitosis is diploid	Number of chromosomes in meiosis is haploid
4.The daughter cells are genetically identical.	The daughter cells are genetically different
5. Mitosis occurs in all organism except viruses.	Meiosis occurs in animals, plants and fungi

Q3. Discuss inheritable characters?

Ans. **Definition:**

The characters which can pass from one generation to the next generation are inheritable character.

Example:

- Eye colour
- Height
- Attached and detached ear lobes
- Intelligence etc

Q4.Discuss non-inheritable characters?

Ans, **Definition;**

The characters which cannot pass from one generation to the next generation are non-inheritable characters.

Example:

- Manner
- Greeting customs
- Food choice

Q5. Explain the need for the production of genetically indenticall cells?

Ans. Genetically identical cells are produced by a type of cells division celled Mitosis.

Function:

The function of this type of cell division is to produce new cells for growth and repair of body tissues.

Importance:

- ➢ It is essential part that the cells are identical so that they have exact copies of the genetic code as the parent cell.
- ➢ If Part of the code is missing or copied incorrectly the cell would not be able to code for essential proteins to function properly

Additional MCQs

1. The tendency of an offspring's to resemble its parents

a. Variations b. Heredity✓
c. Resemblance d. Inheritance

2. _____ is the process by which off springs are produced from their parents.
a. Reproduction✓ b. Photosynthesis
c. Circulation d. Respiration

3. Sexual reproduction takes place in.
a. Human b. Fungi
c. Bryophytes d. All of above✓

4. A sexual reproduction takes place in
a. Fungi b. Bryophytes
c. Bacteria✓ d. None

5. The number of chromosomes is _____ in meiosis.
a, half✓ b. Double
c. Same d. Different

6. DNA is a
a. Heredity Material✓ b. Protein
c. Pigment d. hormone

7. DNA is made up of units called.
a. Genes b. Hormones
c. Pigments d. Nucleotides✓

8. Eye colour is controlled by____
a. Genes✓ b. Chromosomes
c. Germ cell d. Somatic cell

9. The genes of free earlobes are _____ to attach each lobes.
a. Dominant✓ b. Recessive
c. Both a & b d. None of them

10. Segment of DNA are called
a. Genes✓ b. Nuclei
c. Chromatids d. Chromosomes

UNIT 4
BIOTECHNOLOGY

1. MCQs (Choose the correct options)

1. The most effective method to prevent a disease is
a. Surgery
b. Organ transplant
c. Vaccination✓
d. Radiotherapy

2. If a nitrogen fixing gene from cyanobacteria is successfully inserted in plant root cells.
a. Plant roots will fail to grow
b. Plants roots will fix nitrogen✓
c. Plant roots will develop cyanobacteria
d. Plant roots will kill cyanobacteria.

3. A genetically modified rice variety with more iron content will help to treat.
a. Anaemia✓ b. Night blindness
c. Rickets d. Colour blindness

4. Deficiency of insulin in human causes
a. Diabetes✓ b. Heart disease
c. Hypertension d. Epilepsy

5. Which of the following can be used as a biofuel?
a. Kerosene Oil b. high octane
c. Methane✓ d. Ethanol

6. Which of the following is not a product of biotechnology?
a. Polythene✓ b. Insulin
c. Human growth hormone
d. Tymosin

7. Baking process uses enzymes from.
a. Wheat b. Rice
c. Corn d. yeast✓

8. A gene from one organism can be inserted into other one by:
a. Tissue culture b. clonig
c. Genetic engineering✓
d. hybridization

9. What could be the advantage of using micro organism like bacteria to get useful products by genetic engineering?
a. Bacteria grow at very fast rate✓
b. Bacteria cannot be seen with naked eyes
c. Bacteria cause infections
d. Bacteria die very soon.

10. The best solution is hereditary diseases is:
a. Vaccination b. Immunization
c. Chemotherapy d. Gene therapy.✓

B. Short Questions:

Q1. What could be the advantages of microbes produced dyes over synthetic dyes?
Ans, Microbial dyes have many advantages over synthetic dyes.
(i) Microbial dyes are biodegradable non-toxic and non-allergic, making them generally better for the environment and for use around human.
(ii) Microbial dyes don't have any carcinogenic components
(iii) Microbial dyes are obtained from renewable sources that can be harness without imposing harm to the environment.

Q2. Give the advantages of using biodegradable plastic?
Ans. The advantages of using biodegradable plastics are given below;
- It has less Carbon emission
- It takes less energy consumption to manufacture.
- It decreases the waste sent to landfills or incinerators

- It release fewer harmful substance when break down.

Q3. What is the significance of fermented food?

Ans. The significance of fermented food are given below.

- They provide and preserve vast quantities of nutritious food in a wide diversity of flavours, aromas and textures which enrich the human diet.
- Most fermented food contributes bacteria that have a potential probiotic effect. This means that these bacteria may help restore the balance of bacteria in your gut support digestive health and alleviate any digestive issue.

Q4. How biotechnology can transform the way of treating diseases?

Ans. Biotechnology can transform the way of treating diseases by;

- Diagnose of diseases in short time.
- Development of appropriate medicine
- More accurate methods of determining correct drug dosages.
- Improvement in the drug discovery.
- Better vaccine
- Gene therapy

Q5. What could be the best solution to mineral deficiency diseases in third world countries?

Ans. The best solution to mineral deficiency diseases in third world countries is to adding nutrients directly to soil with selective breeding or biotechnology. It is less costly method for reducing deficiencies and disease.

C. Long Questions.

Q1. Explain how biotechnology is helping to solve issues of food shortage?

Ans. Biotechnology helps to solve issues of food shortage by enhancing food production and nutrition's by improvement in livestock's and plants using different techniques of biotechnology such as tissue culture and genetic engineering.

Tissue culture: With the help if tissue culture, crop and plants give more production.

Genetic Engineering:

1. Genetic engineering is used in animals for better production of milk and meat.

For example:

- Neeli ravi bufflalo is produced for better production of milk.
- Nancy sheep is produced for better meat.

2. Genetic engineering is also used for fruits and vegetables with better, quality and improved self lives by creating genetically modified organism (GMO)

Example:

- GMO Strawberry stays fresh longer.
- GMO corn has more yield.
- GMO kiwi with orange peel.

2. What are the applications of biotechnology?

Ans, **Application of biotechnology:**

Four major areas in which biotechnology techniques are applied include agriculture, food production, and preservation, health and environment.

➢ **Agriculture:**

Biotechnology has played an important role in improving our agricultural yield,

Herbicides and pesticides:

Herbicides (Weed killing chemicals) and pesticides (pest killing chemicals) are used to eliminate weeds and insects and thus protect crops.

In Proteins:

Proteins in food may be modified to increase their nutritional qualities- proteins in legumes and cereals may be transformed to provide the amino acid needed by human beings for a balanced diet.

Importance:

- Biotechnology improves the taste texture and appearance of the food.
- The major crops that have been modified are maize, wheat, rice, potato, corn and soya beam.

➢ **Food Production & Preservation:**

In Animals:

High yield of milk and meat can be produced through biotechnology

In fruits and vegetables: The quality of fruits and vegetables can be improved by introduction of better quality genes.

➢ **Health:** Identification of causes of diseases production of medicines and correction of genetic defects are major contribution of biotechnology in the health field.

Example:

Some examples are the following

(i) Insulin (useful for dabetes)

(ii) Vaccine (useful against many infectious diseases)

(iii). Growth hormones (Useful for stimulating growth)

➢ **Environment:**

Environmental problems like pollution, degradation of land and sewage water are also resolved by using technology.

Uses:

(1) Micro organism e.g. genetically modified bacteria re used to treat sewage and garbage's.

(ii) They may also be used to clean spilled oil.

(iii) Microbes which are used as bio-pesticides and bio-fertilizers are being developed by using bio technology technique.

D. Structured questions

1. Think like a biotechnologist.

Plastic pollution is a severe threat to land and water bodies. Recently a very efficient plastic eating mushrooms is discovered in Amazon forest. This mushroom can be grown on landfills to breakdown plastics. But mushrooms cannot grow in water(river, ocean etc) How this mushroom can be used to solve plastic pollution in water bodies. Brainstorm and predict steps that can be used to reach the solution.

Ans. **Step 1**

Identify mushroom gene responsible for plastic breakdown

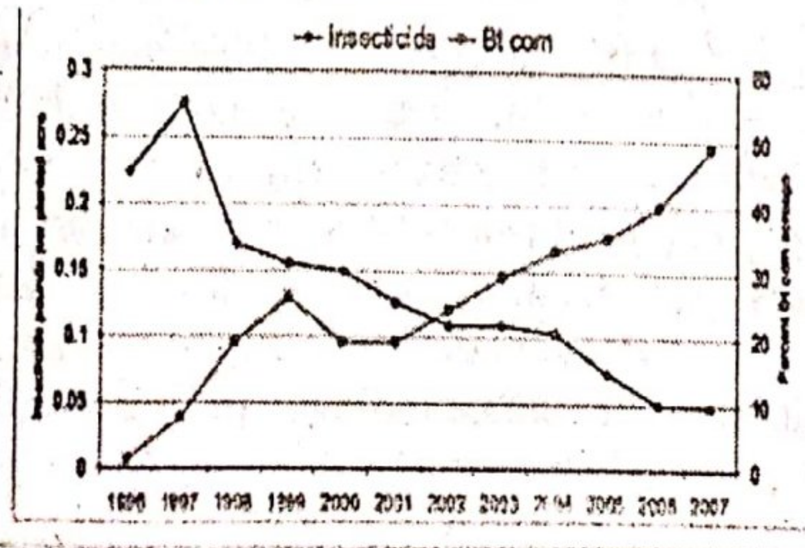
Step 2

Preparation of clones of genes that are responsible for plastic breakdown,

Step3.

Insertion in Mushroom which can grow in water bodies.

Q2. Graph shows use of insecticides and cultivation of genetically modified (GM) corn. Look at the changing and answer the following questions.



a. What type of gene has been inserted in this corn?

Ans. Gene that resist against insects has been inserted in this corn.

b. Why the use of insecticides has decreased progressively?

Ans. Due to gene insertion which resists insects the use of insecticides has decreased progressively.

c. Why farmers preferred genetically modified corn over normal verities?

Ans. Farmers preferred genetically modified corn over normal verities because GMO variety produces more yield.

d. Give the environmental advantages of cultivation of this corn.

Ans, The advantage of cultivation of this corn is it reduces water and environmental pollution.

3. In 1976, Eward Jenner inculated a boy with cowpox virus which is considered the first ever vaccination in human history. Cowpox material developed immunity in that boy against small pox

a. Why cowpox material provided immunity against small pox?

Ans. Cowpox material contains inactive germs that work like a vaccine.

b. What is the present status of small pox?

Ans. In 1980, the world health assembly declared small pox eradicated

c. Why vaccines are considered better solution against infectious diseases?

Ans. Vaccine are considered as better solution against infectious disease because it helps our immune system fight infections faster and more effectively. When we get a vaccine ,it sparks our immune response, helping our body fight off and remember the germs so it can attack it if the germ over invades again.

d. Name diseases against which you have been vaccinated?

Ans. Polio, Measles, Tuberclosis Tetnus, Whooping cough, Hepatitis · Corona (Covid-19) etc.

Activity 4.1

Making of Yogurt

- Take two cups of milk in a pot and boil it for half an hour to stenlize it.
- Let it cool to room temperature.
- Add a spoon of yogurt in the milk
- Mix it well
- Cover the pot with the fowel and incubate it until it set.
- Open it after incubation and see the results.

(a) why you boil milk at the start?

Ans. We boiled milk at the start ot kill germs like bacteria and allows the proteins to denature making a mesh and makes the yogurt thick.

(b). Why you allowed boiled milk to cool at room temperature?

Ans. We allowed boiled milk to cool at room temperature because of hot milk is placed in the fridge the salomella bacteria can spoil the food very easily in fridge.

(c). why you added a spoon of existing yogurt in the milk?

Ans. A Spoon of existing yogurt is added in the milk to increase the fermentation process.

(d) What change you observed after incubation period?

Ans. Yogurt forms when bacteria ferment the milk sugar known as lactose into lactic acid. The lactic acid makes the milk more acidic causing the proteins to coagulate.

(e) What factor caused this change?

Ans, This change is caused by different factors given below.

- Heat processing
- Incubation temperature
- Amount of culture inoculated
- Time of incubation

Additional questions

1. Which medicine became first ever biotechnology medicine to be commercialized?

Ans. In 1982, Insulin become the first ever biotechnology medicine to be commercialized

2. What is the role of genetically modified sheep in human?

Ans. A Genetically modified sheep produces human clotting factors in her milk. This clotting factors helps person suffering from haemophilia

3. What are the genetically modified organisms?

Ans. Genetically Modified organism (GMO) are plants, animals bacteria or virus that have been genetically changed by scientist using DNA from another organism.

4. Define genetic modification?

Ans. Genetic modification is the change in the genetic organization of an organism using biotechnological techniques.

5. What is DNA Replication?

Ans. DNA replication is the process by which DNA makes a copy of itself during cell division.

Additional MCQs

1. DNA of cell is duplicated in a process called

a, Recombination b. Replication
c. Cloning✓ d. Plasmid

2. The fundamental tool of biotechnology is

a. Microbiology✓ b. micro-organism
c. both a and b c. None of above

3. Pencillin is an example of

a. Enzyme b. Hormone
c. Antibiotic✓ d. Antigen

4. Bacteria is a _____ organism

a, Multicellular b. Colourless
c. Unicellular✓ d. None of above

5. In Biotechnology, use of microbes for the manufacturing of the _____ produces.

a. inorganic b. organic✓
c. metallic d. None

6. Biotechnology improves the _____

a. Taste b. Appearance
c. Colour d. Both A and b✓

7. _____ is a important technique of genetic engineering.

a. Genetic testing b. Gene therapy
c. cloning d. All of these✓

8. The organism that contains a foreign gene in its cell is called_____

a. Desired organism b. Transgenic organism✓
c. Isolated organism d. All of these.

9. Transgenic chicken will be resistance to the bacterial infection that can cause.

a. Typhoid b. Pneumonia
c. Food poisoning✓ d. Constipation

10. Transgenic cows produce more milk or milk with less;

a. Lactose✓ b. Amino acid
c. Protein d. Carbohydrates.

UNIT 5
THE PERIODIC TABLE OF ELEMENTS

A. MCQs (choose the correct option)

1. Which of the following group contains alkali metals?]

a. IA✓ b. IIA
c. IIIA d. IVB

2. Which of the following elements is not an alkali metal?

a. Li b. Na
c. K d. Mg✓

3. An element has three electrons in its outermost shell. In which group of the periodic table it is likely to be found?

a. Group IA b. Group IIA
c. Group IIIA✓ d. Group 0

4. Which of the following elements is a metalloid?

a. Gold b. Sulphur
c. Iron d. Silicon✓

5. Lithium is in the same group as

a. Magnesium b. Sodium✓
c. Calcium d. Carbon

6. Which of the following is a halogen?

a. Magnesium b. Sodium
c. Helium d. Fluorine✓

7. How many elements are present in the first period?

a. 2✓ b. 8 c. 18 d. 32

8. How many electrons are present in the outer most shell I group IIIA elements?

a. 1 b.2 c.3✓ d.8

9. Which of the following group contains nobles gases?

a. IA b. IIA c. VIIA d.0✓

10. Period number of neon (atomic number 10) is;

a. 1 b.2✓
c.3 d. 4

B. short Questions

Q1. Write common names for group of normal elements?

Ans. The common names for group of normal elements are:

(1) IA – Alkali metal
(2) IIA- Alkaline earth metal
(3) IIIA- Boron family
(4) IVA- Carbon family
(5) VA- Nitrogen family
(6) VI A- Oxygen family
(7) VII A – Halogen
(8) VIII A- Noble gases/zero groups

Q2. Suggest why copper and aluminium are used in electricity cables?

Ans. Copper and Aluminium are used in electricity cables due to their low resistance and excellent conductivity.
These metals are both ductile and relatively resistant to corrosion, so they can be easily shaped into wire and they do not degrade over time.

Q3. Many pots and pans are made of steel instead of pure iron. why?

Ans. Steel is a good thermal conductor and has shiny appearance. It has high melting point and do not corrode easily by acids present in food. So steel is used in making pots and pans instead of pure iron to with stand high temperature during cooking.

Q4. Write three properties that make gold suitable for making jewellery?

Ans. Three properties that make gold suitable for making jewellery are;
1. Gold has shinny appearance makes jewellery very attractive.
2. Gold is soft and can be easily shaped into different jewellery items.
3. Gold doesn't tarnish, rush or corrode.

Q5, In which portion of the periodic table are present?

Ans.

a. <u>Metal:</u>

Metals appear on the left hand side of the periodic table.

b. <u>Non-Metal:</u>

Non-metals are present on the right hand side of the periodic tables.

Q6. Metals wires can be transformed into different shaped without breaking?

Ans. Metal wires can be transformed into different shapes without breaking because metals are ductile and flexible.

Q7. Why electrical cables are covered with plastics?

Ans. Electrical cables are covered with plastics because plastics are made of non-metals. Plastics are insulator and don't allow electric current to pass through it.

C. Long Questions

How can you locate an element in the periodic tables? Identify the location of following elements in the periodic tables?

Ans.

Aluminium (Atomic number = 13)

Solution
Electric distribution in Aluminium
Al = 2,8,3
1. Valance shell is M, its n value is 3, so Aluminium is present in third period.
2. Total number of valance electrons = 3 , so its group is III-A in the periodic table.
(b) **Silicon (Atomic Number = 14)**
Electric distribution in silicon
Si = 2,8,4
(1) Valance shell is M its n value is 4, so Silicon is present in the third period.
(2) Total number of valance electrons = 4 so its group os IV - A in the periodic table.
c. **Fluroine (Atomic number = 9)**
Electronic distribution in Fluroine
F= 2,7
1. Valance shell is L its n value is 2, so Fluorine is present in second period.
2. Total number of valance electron = 7, so its group is VII-A in the periodic table.

Q2. Justify that properties of metals makes it suitable for making many objects or its parts. Explain with three examples

Ans. **Metals:**
Metals are those substances which are good conductor of heat and electricity.

Properties of Metals:
Following are the properties of metals;

Sonorous:
Metals are good conductors of sound

Ductile:
Metals are ductile which means that they can be used to make this wire.

Malleable:
Metals are malleable which means that they can be used to make their sheets.

State:
Metals are usually solid at room temperature however, there is an exception i.e. Mercury which is usually in liquid form.

Thermal conductivity:
Metal are good conductors of heat.

Electrical conductivity
Metals are good conductors of electricity.

Examples:

1. **Silver:**
Symbol: Ag
State: Silver is a soft, white metal
Precious metal: Silver is known as precious metal because it is rare and has a high economic value.

Uses:

- Silver is mixed with copper to make an alloy, used to make coins, jewellery and table wore.
- Silver is drawn into sheets and wires due to high thermal and electrical conductivity.
- Silver chloride with silver Bromide is used in photography.

2. **Platinum:**
Symbol: Pt
State:
Platinum is heavy, soft metal
Experimental metal:
Platinum is expressive metal
Uses:

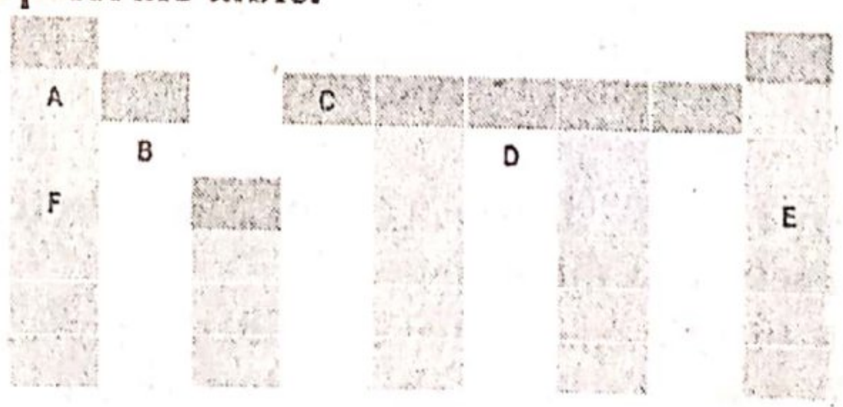
- Platinum used in dental fillings, making surgical tools, coatings and apparatus for scientific Labourites.
- Platinum is used in making photographic materials.
- Platinum is used in lasers.

3. **Gold**
Symbol: Au
Properties:
Gold has high luster, attractive colour, inertness, high ductility etc.
Uses:

- Gold is used in making Gold coins.
- Gold is used in standard desktop and laptop computers.
- Gold alloys are used for making dental fillings tooth crowns and orthodontic appliances.

D. Structured Question.

1. Following figure shows some elements in the periodic table.



A = Lithium (Li) B = Magnesium (Mg)
C = Boron (B) D = Phosphorous (P)
E = Krypton (Kr) F = Potassium (K)

a. Which elements are present in the in the same group

Ans. A (Lithium) and F (Potassium)

B Which elements are present in the same period

Ans A (Lithium) and C (Boron)

B (Magnesium) and D (Phosphorous)

F (Potassium) and E (Krypton)

c. What is the group number of C?

Ans. III- A (Boron family)

(d) Which elements have same number of electrons in their outermost shell?

Ans. A (Lithium) and F (Potassium)

(e) Which elements is a noble gas?

Ans, E (Krypton)

(f) Which elements is alkaline earth metal?

Ans. B = Magnesium

(g) In which group E is present?

Ans. VIII – A (Nobel gases)

(h) Which element has two electrons in its outermost shell?

Ans. B (Magnesium)

Q2. Element Carbon (At No. 6) is present in group IV A in the periodic table?

a. Why is carbon placed in group Iv-A in the periodic table?

Ans. Electronic configuration of Carbon = 2,4

As Carbon has four electrons in its valance shells so, it is present in group IV- A.

(b) How many electrons Carbon needs to complete its valance shell?

Ans. Carbon Needs four electrons to complete its valence shell.

(c) How many single bonds carbon can make?

Ans. Carbon makes four single bonds.

Q3. Draw electronic structure of.

(a) Oxygen (At. No = 8)

O =2,6

b. Fluorine (At No.9)

F = 2,7

c. Neon (At. No. 10)

Ne = 2,8

Write the difference in the electronic structure of these elements?

All these elements have different numbers of electrons in valance shells. Here valance shell is second shell i.e. L-shell.

Stop and check

How many periods do you find in periodic table?

Ans, There are seven periods in the periodic table.

Activity 5.1

Look at the periodic table and complete th missing data in the following table?

Period No	No of element
First	2
Second	8
Third	8
Fourth	18
Fifth	18
Sixth	32

Activity 5.2

Draw the electronic structure of following elements present in Group IA

- **Lithium Li (atomic number 3)**
- **Sodium ,Na(atomic number 11)**
- **Potassium, K(atomic number 19)**
- **How many electrons these elements contain in their outermost shell?**

Solution:

Electron distribution in these elements is

Li = 2, 1

Na = 2, 8, 1

K = 2, 8, 8, 1

In group IA all the elements have one electron in their outer most shells.

Draw the electronic structure of the following elements present in Group IIA

- **Beryllium, Be (Atomic number 4)**
- **Magnesium Mg (Atomic number 12)**
- **Calcium Ca (Atomic number 20)**
- **How many electrons these elements contain in their outer most shell?**

Solution:

Electron distribution in these elements is

Be =2, 2 Mg = 2, 8, 2 Ca = 2, 8, 8, 2

In a group IIA all the element have 2 electrons in their outer most shell.

Activity 5.3

Malleability of metals and non-metals

Beat a thick piece of iron, copper and aluminium many times with hammer, what happen?

Ans. When a thick piece of Iron, Copper and Aluminium, is beaten many times with hammer, energy of hammer transfers to metals and converts into heat and metals deforms because they are malleable.

Beat a thick piece of coke (Carbon) and sulphur. What happen?

Ans. When a thick piece of coke (Carbon) and Sulphur is beaten by hammer, it breaks down

...smaller pieces. As both are non- metals so ...are non-malleable.

Activity 5.4

Flexibility of metals and non-metals

- **Take Copper, Iron and Aluminium wires**
- **Try to bend graphite (Carbon) rod. Are you able to bend them easily? Do they break when are bend?**

Ans. As Copper, Iron and Aluminium belongs to metals and metals are flexible so they can easily bend but graphite belongs to non-metals so it is non-flexible and doesn't bend and it will break.

Activity 5.5

Density of metals and non-metals

- **Take a small bar or nut or shee4t of metals such as copper, iron and aluminium.**
- **Place one after the other, each bar ior nut or sheet on the surface of water in a trough?**
- **What do you observe?**
- **Which do you think is heavier, water or metals?**

Ans. When a small bar or nut or sheet of metals such as Copper, Iron and Aluminium are placed in the surface of water, they all sink in water beaker metals are heavier (denser than water)

Activity 5.6

Thermal conductivity of metals and non-metals

- **Place a metal spoon and wood spoon in a bowl of hot soup.**

Which spoon becomes hot more quickly?

Ans. 1. Metals spoon in a bowl of hot soup becomes hot more quickly because it allows heat to pass through it due to its high thermal conductivity.

Which spoon would you use to eat a bowl of soup? Why?

2. Wooden spoon is used to eat soup because of less thermal conductivity. They don't melt into hot food and easy to use.

Activity 5.7

Sonorous nature of metals and non-metals

- **Beat an aluminium plat with a hammer.**
- **Beat a copper plat with a hammer,**
- **Beat plastic or wooden plat with a hammer.**
- **Which of these produces deep or ringing sound?**

Ans. Copper is more sonorous and produces deep or ringing sound because of its metallic property.

Additional questions

Q1. Why is names earths given to alkaline earth metals?

Ans. Early chemist gave the name earths to alkaline earth metals. This is because they are found both in the earth crust and sea water.

Q2. Identify at least two groups which contain only metallic elements?

Ans. Group I and II elements are metallic in nature. They are electropositive, ductile and malleable.

Q3. Pure Gold is not used for ornaments? Why?

Ans. Pure Gold is not used for ornaments because pure gold is very soft in nature as gold atoms easily slide over one another. Pure gold has low stiffness they show no resistance to bending and are bend without much effort.

Q4. Write down difference between metals and non-metals

Metals	Non-Metals
Shiny appearance	Dull appearance
High density	Low density
Malleable	Non-malleable
Ductile	Non-ductile
High melting point	Low melting point
High boiling point	Low boiling point
High electric conductivity	Low electrical conductivity
High thermal conductivity	Low thermal conductivity

Q5. Which elements posses same chemical properties?

Ans. The elements have same number of electrons in their outermost shell, possess similar chemical properties.

Q6. Why air ship are very light and uncreative?

Ans. Airships are filled with helium since it very light and uncreative.

Additional MCQs

1. The word Alkali means

a. Base b. Basic salt
c. Acid d. Ashes✓

2. Elements Nobelium was discovered by _____

a. Arhenous b. Lawis
c. Alfered Nobel✓ d. Mendeleves

3. Lithium belongs to _____

a. First b. Second✓
c. Third d. Fourth

4. The vertical column in the periodic table is called

a. Group✓ b. Period
c. Lanthandides d. Actinites

5. Electronic distribution of Magnesium is.

a. 2, 8, 2✓ b. 2, 8, 1
c. 2, 8, 3 d. 2, 8, 4

6. Metals are _____

a. Ductile b. Malleable
c. Sonorous d. All of them✓

7. The horizontal rows in the periodic table are called _____

a. Group b. Family
c. periods✓ d. None of them

8. The elements in the periodic table are arranged in order of increasing____

a. Atomic number✓ b. Atomic mass
c. both a and b d. None of them

9. Most of the non-metals exists in ---- state

a. Liquid b. Gaseous✓
c. Solid d. None of them

10. The number of elements in fifth periods is

a. 2 b. 8 c. 18 d. 32

UNIT 6
CHEMICAL REACTIONS AND BONDING

A. MCQs (Choose the correct options)

1. Which of the following group contains alkali metals?

a. IIA b. IIIA
c. VII A d. IA✓

2. The reaction between sodium and water produces

a. H_2✓ b. O_2 c. NaCl d. Na_2CO_3

3. Photosynthesis in green plants is

a. Synthesis✓ b. Decomposition
c. Combustion d. Endothermic

4. The reaction between magnesium and hydrochloric acid is:

$Mg_{(s)} + 2HCl_{(aq)} \rightarrow MgCl_{2(aq)} + H_{2(g)}$

Which substance indicates the reaction has taken place?

a. Mg✓ b. HCl
c. H_2 d. $MgCl_2$

5. Which of the following reactions is unbalanced?

a. $C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}$
b. $H_{2(g)} + Cl_{2(g)} \rightarrow 2HCl_{(g)}$
c. $KClO_{3(s)} \rightarrow KCl_{(s)} + O_{2(g)}$✓
d. $Ca_{(s)} + S_{(s)} \rightarrow CaS_{(s)}$

6. An endothermic reaction occurs when

a. Carbon burns in air.
b. Electrical discharge in the atmosphere nitrogen combines with oxygen
c. Natural gas burns in air.
d. Hydrogen combines with oxygen to form water.✓

7. Which of the following is not a chemical reaction?

a. Rusting b. Frying an egg
c. Photosynthesis d. Melting of ice✓

8. When copper sulphate solution is mixed with sodium hydroxide solution, the chemical reactions is indicated by:

a. Emission of a gas. b. odour change
c. Temperature Change
d. Formation of precipitate✓

9. What happens when few drops of iodine solution is added in starch solution?

a. Gas is emitted
b. Precipitates are formed✓
c. Colour change occurs
d. Bad odour is emitted

10. Which of the following is not a balance chemical reaction?

a. $H_{2(g)} + Cl_{2(g)} \rightarrow 2HCl_{(g)}$
b. $H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(l)}$✓
c. $C_{(s)} + O_{2(s)} \rightarrow CO_{2(g)}$
d. $2NH_{3(g)} \rightarrow N_{2(g)} + 3H_{2(g)}$

B. short Questions

Q1. What is a chemical reaction? Give two examples?

Ans. **Chemical Reactions:**

Definitions:

The process of formation of breaking of a chemical compound is called chemical reaction.

Example:

1. Lime stone (Calcium carbonate) on thermal decomposition gives quick lime (CaO) and Carbon dioxide

$CaCo_3 \rightarrow CaO + CO_2$ in the presence of heat

2. Plants prepare their food (Glucose) by the reactions of Carbon dioxide and water in the presence of sunlight.

$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

Q.2. State the law of conservation of mass?

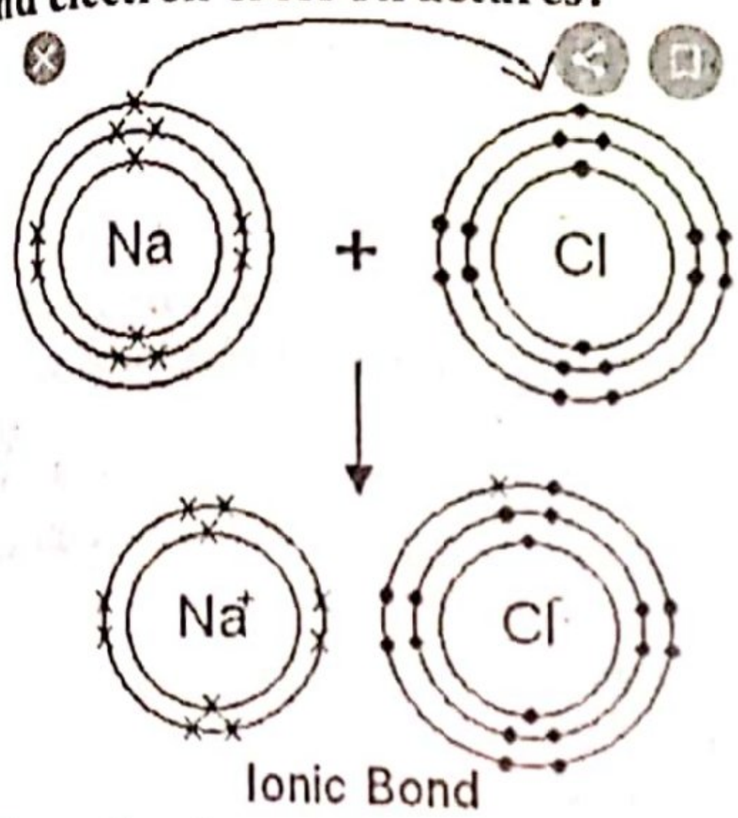
Ans. According to law of conservation of mass;

Matter is neither created nor destroyed during chemical reactions.

Q3. Write a balanced chemical equation for the reaction between methane and oxygen?

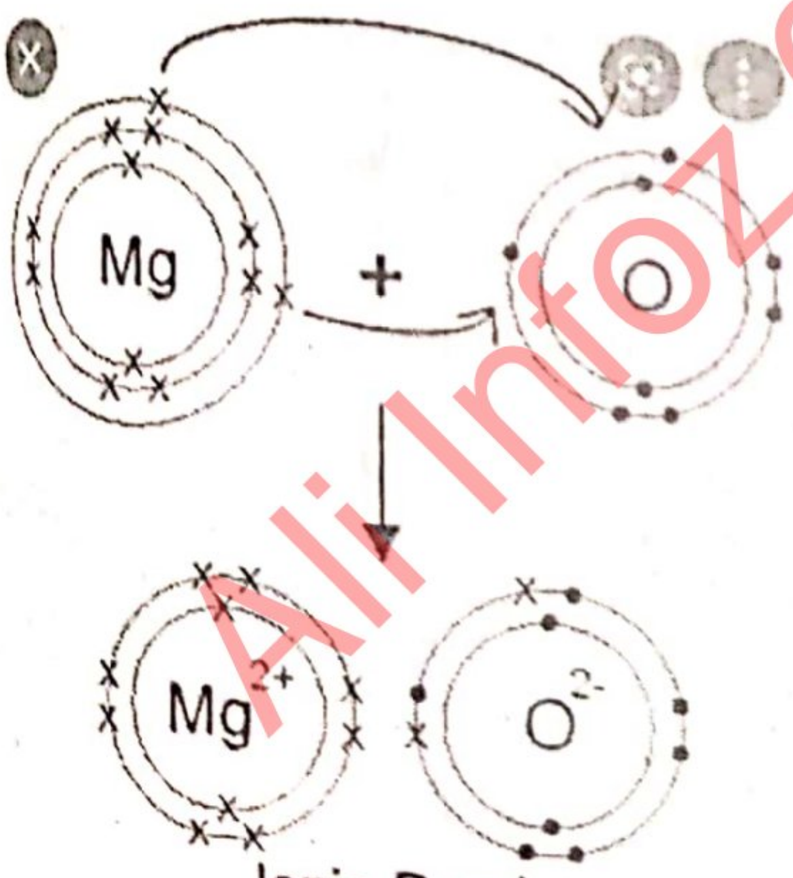
Ans. $CH_4+2O_2 \rightarrow CO_2+2H_2O$

Q4. Show formation of NaCl by electron – dot and electron cross structures?



Ionic Bond

Q5. Show the formation of Mgo by electron dot and electron cross structure?
(Atomic number Mg = 12, 0 = 8)



Ionic Bond

Q6. Define the following

a. Double covalent bond

Ans. **Definition:** The covalent bond which is formed by mutual sharing of two electron pairs between two atoms is called as double covalent bond.

Representation:

It is represented by double lines (=).

Example:

(i) O_2 (ii) CO_2 etc

b. Triple covalent Bond.

Definition:

The covalent bond which is formed by mutual sharing of three electron pairs between two atoms is called as triple covalent bond.

Representation:

It is represented by triple lines (≡)

Example:

i. N_2 ii. C_2H_2 etc

Q7. What is a double displacement reaction? Give one example?

Ans. **Double Displacement reactions:**

Definition:

A chemical reactions in which two atoms or groups of atoms exchange places and form new compounds is called double displacement reaction.

Example:

When Silver Nitrate ($AgNO_3$) solution is added to Sodium Chloride solution, a double displacement reaction occur s and new compounds Silver Chloride and Sodium Nitrate are formed

$AgNO_{3(aq)}+NaCl_{(aq)} \rightarrow AgCl_{(s)}+NaNO_{3(aq)}$

Q8. Give one example of for each of the following reaction/

Ans, **Combustion**:

Coal in Carbon, when it burns in air it produces Carbon dioxide

$C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}$ +Heat + light

Combination:

Carbon combine with Oxygen to form Carbon dioxide.

$C_{(s)} + O_{2\,(g)} \rightarrow CO_{2(g)}$

Displacement:

Zinc can displace Hydrogen from acids

$Zn_{(s)} + H_2SO_4 \rightarrow Zn\,SO_{4(aq)} + H_{2(g)}$

Q9. Give one example of each of the following from daily life.

Ans. **(a) Exothermic reactions:**

Example:

The heat released during respiration, not only keeps us warm but also provides energy for our normal functions.

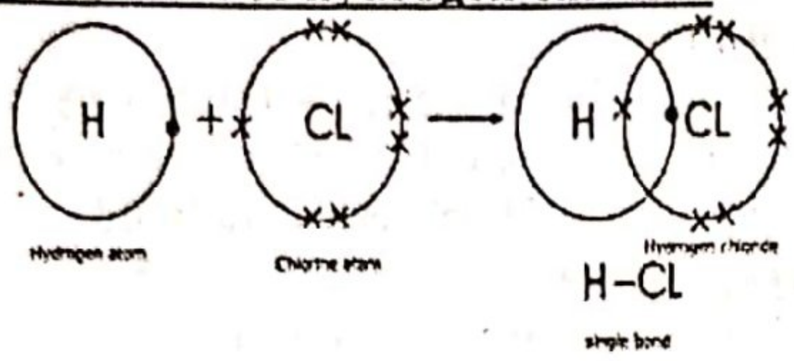
(b) Endothermic reactions

Example:

When cake dough is heated in an oven, an endothermic reaction occurs heat absorbed changes cake dough into a fluffy and delicious material .

Q10. Show the formation of covalent bonds between hydrogen and chlorine

Ans. **Formation of hydrogen chloride**



C. Long Questions

Q1. Discuss the formation of ionic bond with an example?

Ans. **Ionic Bond :**

Definition

The chemical bond which is formed due to complete transfer of electron (s) from one atom to the other atom is called ionic bond.

Example:

Formation of sodium chloride (Nacl)

Sodium (Na) and chloride (Cl) combine to give Sodium Chloride (Nacℓ)

Sodium (Na):

Atomic number:

The atomic number of Sodium (Na) is 11.

Electronic Configuration:

Its electronic configuration is 2, 8, 1.

Explanation:

It is clear that Sodium has one electron in its outer most shell. It has the tendency to lose one electron to attain the inert gas electronic configuration of Neon so the Sodium ion (Na^+) is formed.

Chlorine (Cl^-)

Atomic number:

Atomic number of Chlorine (Cl) is 17.

Electronic Configuration:

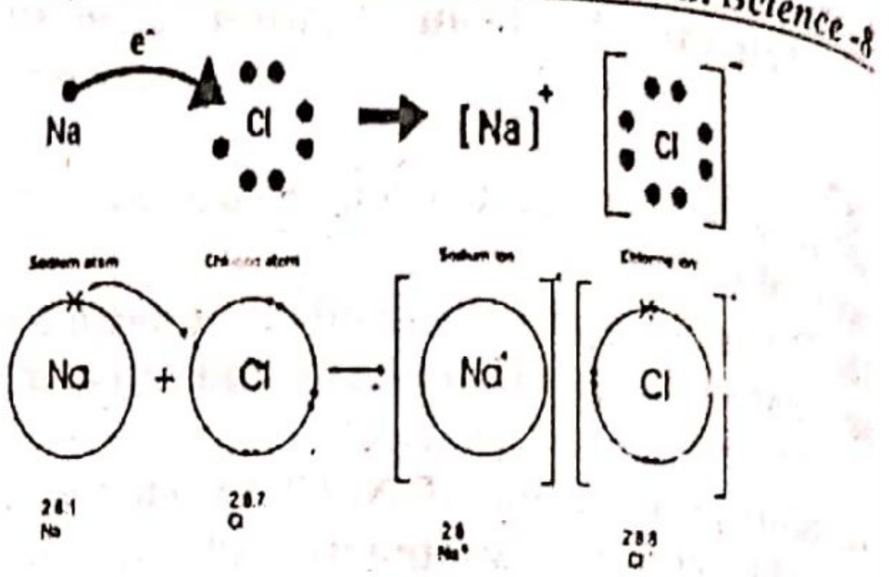
Its electronic configuration is 2, 8, 7

Explanation:

It is clear that Chlorine (Cl) needs one electron to complete its outer most shell. It has the tendency to gain one electron to attain inert gas electronic configuration of Argon. So it forms Chloride ion (Cl^-).

Formation if Sodium Chloride Nacℓ).

We know that opposite chargers attract each other therefore, an electrostatic force of attraction is set up between Na^+ and $Cℓ^-$ ion. This force units there ions in a crystalline lattice. In this way, an ionic bond is formed between Na^+ and $Cℓ^-$ ions, which results in the formation of Sodium Chloride.



Q2. What are covalent bonds? Discuss its types?

Ans. **Covalent Bond:**

Definition:

The chemical bond formed between two bonded atoms by sharing of electrons is called covalent bond.

Types:

There are three types on the basis of shared pair of electrons. These are;

1. Single covalent bond.
2. Double covalent bond.
3. Triple covalent bond.

1. Single Covalent Bond:

Definition:

The Covalent bond which is formed by mutual sharing of one electron pair between two atoms is called single covalent bond.

Representation:

It is represented by single line (-)

Example:

1. H_2 2. HCl 3. CH_4 etc

2.Double Covalent Bond:

Definition.

The covalent bond which ifs formed by mutual sharing of two electron pairs between two atoms is called as double covalent bonds.

Representation:

It is represented by double line (=)

Examples:

(1) O_2 (2). CO_2 etc

3. Triple covalent Bond:

Definition:

The covalent bond which is formed by mutual sharing of three electrons pairs between two atoms is called as triple covalent bond.

Representation:

It is represented by triple line (≡)

Example:

(i) N_2 (ii) C_2H_2 etc.

D. structured Questions

1. When coral burns it produces carbon dioxide and leaves as behind .Ash produced in the reaction is lighter than coal.

a. Does this contradict the law of conservation of mass? Justify your answers?

Ans. No, it doesn't obeys the law of mass conservation.

According to law of mass action mass cannot be created nor destroyed.

In a burning log, the initial mass of the wood and the ashes that are left behind after it burn are different, which would seems to Violate the law of conservation of mass.

b. Classify this reaction:

ans. This reaction is classified as addition reaction.

c. Write a balanced chemical equation for this reaction?

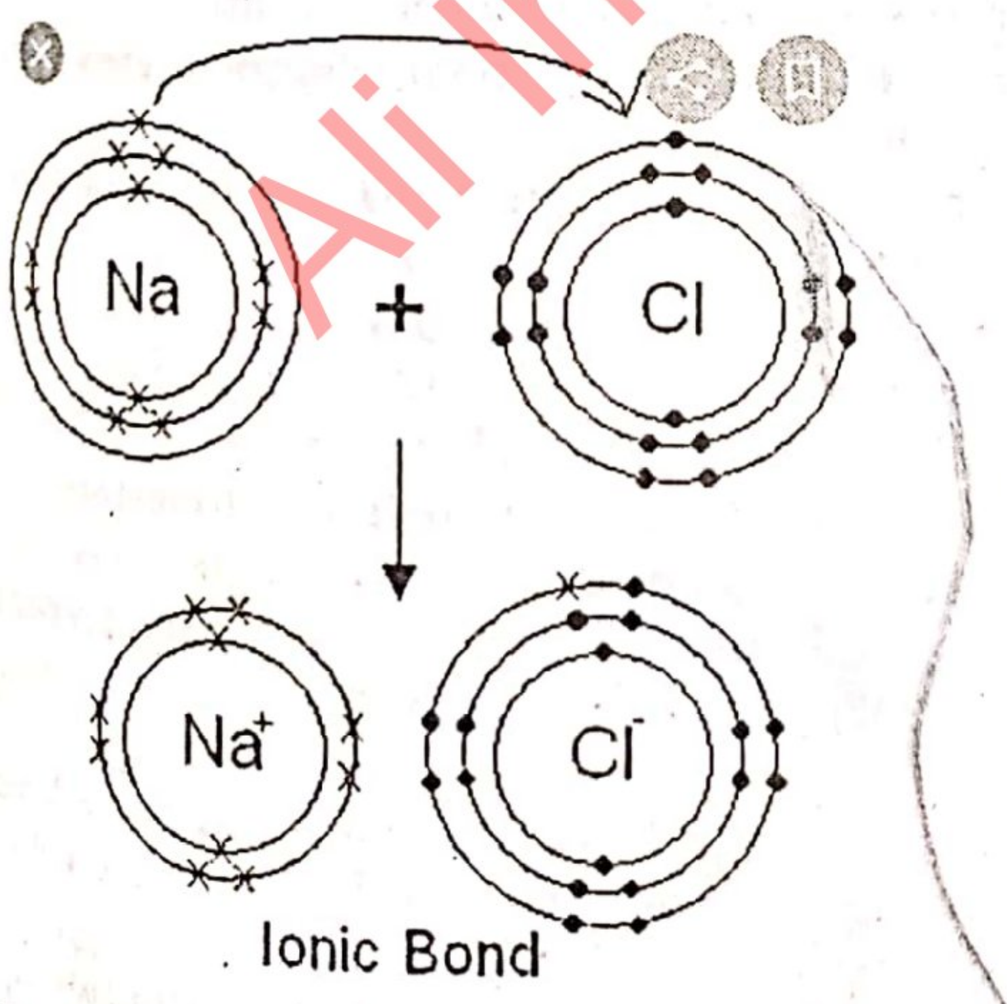
Ans. $C+O_2 \rightarrow CO_2 + Ash$

2. Element X is in group IA and Element Y is in Group VII-A

a. What type of bond between them will be formed? Explain?

Ans. Group I-A belongs to metals and Group VII-A belongs to non-metals. Metals always lose electrons to form cation and non-metals always gain electron to form anions. So the bond formed is ionic bond.

b. Draw electron- dot and electron-cross structure to show the formation of bond between them.



iii. Classify the following reactions as exothermic or endothermic reactions

Combustion	Exothermic reaction
Decomposition	Endothermic reaction
Neutralization	Exothermic reaction
Reaction between baking soda and vinegar	Endothermic reaction

4. Two chemical reaction are occurring in beaker A and Beaker B. In beaker A temperature change from 25° C to 40° C. in beaker B, temperature change from 25°C to 20°C.

a. What are the changes in temperature in these beakers?

Ans. In Beaker A, temperature changes from 25°C. to 40°C means it is exothermic reaction.

In beaker B, temperature changes from 25° to 20° C means it is endothermic reaction.

b. Which of these reactions is exothermic and endothermic?

Ans. Reaction in Beaker A = Exothermic

Reaction in Beaker B = Endothermic.

Activity 6.1

Identifying signs of chemical reactions.

Material Required:

- Beaker, test tube.
- Solution of Iodine, Starch, Copper sulphate, Sodium hydroxide.
- Vinegar and baking soda.

Procedure:

- Arrange three beakers on the table and label them as 1, 2, 3
- Add half test tube of starch solution in the first beaker add few drops of Iodine solution in it.

Record you observation:

When starch is present, the iodine changes from brown to blue-black or purple.

Q Add $2cm^3$ of copper sulphate in the second beaker. Add few cm^3 of Sodium hydroxide solution in it. Record you observation.

Ans, Copper sulphate reacts with Sodium hydroxide to form a blue precipitate of Copper hydroxide and Sodium Sulphate.

Q. Touch the outer side of the beaker with you hand Record your observation?

Ans. By touching the outside of this beaker with your hand, the beaker felts hot means it is exothermic reaction.

Q. Add 25 cm^3 of vinegar in the third beaker. Add about half spoon of baking soda in it. record your observation?

Ans. When baking soda is mixed with vinegar, the acid break down baking soda releasing Carbon dioxide gas that can help lift dirt from the surface being cleaned.

Q. Touch the outer side of this beaker with your hand. Record you observation.

Ans. Since carbon dioxide releases, so temperature went down causes endothermic reaction.

Balance the following chemical equations.

(1) $H_{2(g)} + O_{2(g)} \rightarrow H_2O_{(g)}$

Identification of elements

H_2O

Reactants	Products	Remarks
H = 2	H = 2	Balanced
O = 2	O = 1	Balanced

Balanced Equation

$2H_2+O_2 \rightarrow 2H_2O$

2. $Ca_{(s)} + O_{2(g)} \rightarrow CaO_{(s)}$

Identification of elements

Ca , O

Reactants	Products	Remarks.
Ca = 1	Ca = 1	Balanced
O = 2	O = 1	Unbalanced

Balanced Equation

$2Ca+O_2 \rightarrow 2\ CaO$

3. $H_2O_{2(l)} \rightarrow H_2O_{(l)}+O_{2(g)}$

Identification of elements

H, O

Reactants	Products	Remarks
H = 2	H = 2	Balanced
O = 1	O = 3	Unbalanced

Balanced Equation

$2H_2O_2 \rightarrow 2H_2O+O_2$

4. $Ag+O_2 \rightarrow Ag_2O$

Identification of element

Ag, O

Reactants	Products	Remarks
Ag = 1	Ag = 2	Unbalanced
O = 2	O = 1	Unbalanced

Balanced equation

$4Ag+2O_2 \rightarrow 2Ag_2O$

Stop and Check

Commercially sodium is obtained by passing electricity through molten Nacl, Cl_2 is also produced in this reaction.

1. Write a balanced chemical equation for this reaction

$2NaCl \rightarrow 2Na + Cl_2$

2. Name the type of reaction

Decomposition reaction

Additional Questions

1. Why piece of apple when placed in air turns brown?

Ans, When you get an apple and place it in air, it turns brown after some tome. This is due to a chemical change Iron present in apple combines with Oxygen of the air and forms a new substance, Iron oxide which is yellow brown.

Fe^{2+} Oxidation Fe^{3+}

Light Green Yellow Brown

2. When butter is placed in open air for some days it has unpleasant taste and bad odour?

Ans. Butter develops unpleasant taste and bad odour when placed in open air for some days. Chemical action of bacteria converts butter fat into butyric acid, which has bad taste and bad odour.

3. Define precipitation?

Ans. Precipitation is the formation of an insoluble solid when two solution are mixed or a gas is bubbled into a solution.

4. Define combustion?

Ans. When a substance reacts with Oxygen and releases energy, the reaction is called as combustion.

5. What is burning?

Ans. When a flame is produced with the release of energy it is called burning.

6. Explain industrial applications of synthesis reaction?

Ans. Synthesis reactions have many industrial applications as;

Addition of Hydrogen to vegetable oil in the presence of catalyst is used to convert them into vegetable ghee and margarine.

7. Explain the decomposition of limestone?

Ans. Decomposition of limes stone is used for the production of lime (Calcium oxide) which is a major constituent of cement

$CaCO_3 \xrightarrow{Heat} CaO + CO_2$

8. Why you feel cool, fizzy and refreshing feeling in your mouth by using sherbet sweets.

Ans. Sherbet sweets contain a mixture of dry citric acid and Sodium hydrogen carbonate when you eat it, these substances dissolves in your saliva and reacts together. An endothermic

reaction occurs. This given a cool, fizzy and refreshing feeling in your mouth.

Additional MCQs

1. Those substance which will combine are called
a. Reactants✓ b. Products
c. Catalyst d. None of these

2. Law of conservation of mass was put forward by,
a. Lavoisier✓ b. Boyles
c. Charles d. All of the them

3. Law of conservation of mass of put forward in
a. 1765 b. 1775 c. 1785✓ d. 1795

4. Simple way of writing an element and a compound is:
a. Formula b. Symbol
c. Reaction d. Both a and b✓

5. The chemical reaction during which heat us absorbed is called _____ reaction.
a. Decomposition b. Addition
c. Endothermic d. Exothermic✓

6. Heat evolved or absorbed during a chemical reaction is called.
a. Heat of reaction✓ b. Heat of equation
c. Heat of change d. All of above

7. When compound are broken down into simper element these reactions are.
a. Decomposition✓ b. Additions
c. Synthesis d. Combination

8. Formation of ammonia is _____ process
a. Exothermic✓ b. Endothermic
c. Both a and b d. None of these

9. Burning of natural gas is _____ process
a. Exothermic✓ b. Endothermic
c. Both a and b d, None of above

10. ____ shows the direction of an equation.
a. Arrow✓ b. Symbol
c. formula d. All of the above

UNIT 7
ACIDS, BASES AND SALTS

A. MCQs (Choose the correct option)

1. Which of the following ph value denotes acid?
a. 11 b. 8 c. 3✓ d. 7

2. Which acid is present in vinegar?
a. HCl b. HNO_3
c. CH_3COOH✓ d. H_2CO_3

3. A solution is strongly acidic, if its pH is:
a. Greater then 7 b. 7
c. 1✓ d.14

4. When dissolved in water, acids give?
a. OH^- b. Cl^-
c. H^+✓ d. Na^+

5. Which of the following is not an alkali?
a. KOH b. NaOH
c. H_2CO_3✓ d. $Ca(OH)_2$

6. Which of the following is salt?
a. NaOH b. HCl
c. NaCℓ✓ d. HNO_3

7. Which acid is used in car battery?
a. HCl b. HNO_3
c. CH_3COOH d. H_2SO_4✓

8. When a ant or a bee stings you, it injects
a. an alkali b. an acid✓
c. a salt d. water

9. Which of the following in NOT a mineral acid?
a. Hydrochloric acid b. Sulphuric acid
c. Acetic acid✓ d. Nitric acid

10. Acids react with carbonates to liberate
a. Hydrogen b. oxygen
c. Carbon dioxide✓ d. ammonia

B. Short question

Q1. You cannot neutralise the effects of wasp sting with calcium hydroxide. Give reason?
Ans. You cannot neutralize the effects of wasp sting with Calcium hydroxide because when a wasp sting you, it injects an alkali in your skin this cause burning, pain and swelling on your skin. You can neutralize the effects by rubbing an acid like vinegar on it but here Calcium hydroxide is alkali (base) not an acid.

Q2. You can neutralize the effect of bee sting with calcium hydroxide. Give reason?
Ans. When a bee stings you, it injects an acid under your skin. You can neutralize it by rubbing any alkali, so here Calcium hydroxide is used to neutralize the effect of bee sting.

Q3. Antacids are used to treat indigestion. Justify?
Ans. As we know that our stomach produces Hydrochloric acid, which helps in digestion, some times stomach produces excess of Hydrochloric acid. This causes burning in stomach called indigestion. Antacids contain alkalies such as magnesium hydroxide also knows as milk of Magnesia. During indigestion, taking milk of magnesia gives relief since it neutralizes the effects of excess acid.

Q4. Which acid and base would you use to make potassium chloride?

Ans. Acid like Hydrochloric acid and base as Potassium hydroxide mix together to form Potassium Chloride.

Equation:

Hydrochloric acid+ potassium hydroxide

↓

Potassium Chloride + Water

$HCl + KOH \longrightarrow KCl + H_2O$

Q5. Toothpastes are made slightly alkaline. Justify?

Ans. As we know that bacteria decay food particles in our teeth and produces acid. This acid causes tooth decay. That's why to tooth parts are slightly alkaline so that brushing tooth paste neutralize acid and prevents tooth decay.

Q6. Which of the following solution will have pH more than 7.

Ans.

i.Milk of Magnesia:

pH of milk of magnesia is 10.5 so it is basic.

ii. Drain cleaner:

(pH above than 7)

pH of drain cleaner is 14. So it is basic.

iii. Vinegar:

(pH less then 7)

pH of vinegar is 2.4 – 3.4, so it is acidic.

C. Long Question

Q1. Describe acids and bases with at least three examples?

Ans. **Acid**

Definition: An acid is a substance that gives Hydrogen ions (H^+) when dissolved in water.

Example:

HCl (Hydrochloric acid)

H_2SO_4 (Sulphuric acid)

HNO_3 (Nitric acid)

Base:

Definition: Base is a substance gives hydrochloric ion (OH^-) when dissolved in water.

Example.

NaOH	(Sodium hydroxide)
KOH	(Potassium Hydroxide)
$Cu(OH)_2$	(Copper hydroxide)

Q2. Differentiate between strong and weak acids with examples.

Strong Acids	Weak acids
1. Strong acids are molecules that completely dissociates into their ions when it dissolved in water	Weak acids are molecules that partially dissociates into ions when dissolved in water.
2. pH of a strong acid solution is very low	pH of a weak acid solution is about 3-5
3. Release of all H^+ ions to the solution	Don't release all the H^+ ions to the solution
4. Example -Hydrochloric acid. - Sulphuric acid - Nitric acid	Example - Carbonic acid - Nitrous acid - Phosphoric acid

3. Give example of strong and weak bases?

Ans.

a. Strong Bases:

Definition:

Those bases which are almost completely dissociates in water and gives higher concentration of Hydrogen ion (OH^-) are called strong base.

Example:

- Potassium hydroxide (KOH)
- Sodium hydroxide (NaOH)
- Lithium hydroxide (LiOH) etc

B. Weak bases:

Those bases which do not dissociate completely in water are called as weak bases.

Example:

- Ammonium hydroxide (NH_4OH)
- Calcium hydroxide $Ca(OH)_2$
- Aluminium Hydroxide $Al(OH)_3$

D. Structure Question.

Q1. In an experiment, a student is adding hydroxide acid to sodium hydroxide solution until the pH of the mixture changes to 7.

a. How can be find out if the Ph of the mixture changed to 7?

Ans. We can find out by the help of litmus paper if the pH of the mixture changed to 7. Because we know that litmus paper is used to detect acidic or basic behaviour in solution.

B. Is the mixture acidic, alkaline or neutral when pH is 7?

Ans. The mixture is Neutral when pH is 7.

C. What products are present in the beaker, when pH changes to 7?

Ans. Products are present in the beaker, when pH changes to 7 are Sodium Chloride (Nacl) and water (H_2O).

D. What will happen to the pH if more or excess hydrochloric acids is added?

Ans. If more or excess Hydrochloric acid is adopted than the pH will becomes less shows acidic behaviour.

Q2. A chemical reaction is accruing between two substances in a beaker. Temperature changes from 25°C to 50°C in the beaker and pH changes to 7.

a. Is the reaction exothermic? Explain your answer?

Ans. The temperature changes from 25°C to 50°C. in the beaker means temperature increases so, the reaction is endothermic .

b. What type of chemical reactions has occurred in?

Ans. As pH changes to 7, it means any neutral species (salt) is present. So it is neutralization reaction.

C. What type of reactants are present in the beaker?

Ans. Acids or bases are present as the reactants in the beaker.

D. What could be the final products in the reaction?

Ans, The final products in the reaction is salt and water.

Acid + Base ⟶ Salt + Water

Activity 7.2

Sodium hydroxide, water, blue and red litmus paper, beaker.

Procedure:

- **Transfer $10cm^3$ of water in a beaker.**
- **Add two pallets of sodium hydroxide and mix it well.**
- **Divide this solution into two parts and dip blue litmus paper in one part and red litmus paper in the second part.**

Record your observation:

Sodium hydroxide is a base.

1. There is no effect on blue litmus paper.
2. Red litmus paper turns blue.

Activity 7.4

Determining pH

Material required

- pH paper
- solution of strong acids such as HCl, H_2SO_4.
- Solution of strong alklies such as NaOH ,KOH
- Sugar solution, distilled water, beaker.

Procedure:

- place solutions of acids, alkalies, sugar and distilled water in separate beaker.
- Dip a piece of pH paper in each beaker.
- Record your observation in the following

Substance	Colour developed pH paper	pH value
HCl	Red	0
H_2SO_4	Red	1
NaOH	Purple	14
KOH	Dark purple	13
Sugar	Green	07
Distilled water	Green	07

Q. What are the two products of neutralization reaction between Potassium hydroxide (KOH) and hydroxide acid.

Ans. Potassium Chloride and Water

Write chemical equation for this reaction.

$KOH + HCl \longrightarrow KCl + H_2O$

Additional Questions

Q1. Define salts name its types?

Ans, **Salt**

When acid and base combine with each other, salt and water is formed.

Types:

There are four type of salt

- Normal salts
- Acidic salts
- Basic salts
- Double salts

Q2. Define Indicators?

Ans. Indicators are those substances that change colour when added to an acid or alkali.

Q3. Write few properties of acid?

Ans. 1. Acids have a sour taste.
2. Acids turn blue litmus paper red.
3. Acids are water soluble.
4. Acids are electrolytes in water.

Q4. Define electrolytes?

Ans. Those substances which conduct electric current are called electrolyte.

Q5. Enlist few properties of alkalies?

1. Alkalies have bitter taste

2. Aqueous solution of an alkali has slippery touch.
3. Alkali turns red litmus paper blue.
4. Alkalies in aqueous solution are electrolytes.

Q6. Define neutralization reaction?

Ans. When acid and base combines with each other to form salt and water is called neutralization reaction.

Example:

$HCl + NaOH \longrightarrow NaOH + H_2O$

Acid Bsae Salt water

Q7. Name few indication and explain their behaviour in acidic and basic medium.

Indicator	Colour in acid	Colour in alkali
Litmus	Red	Blue
Methyl orange	Red	Yellow
Phenolphthalein	colourless	Pink

Q8. What is pH?

Ans. A numerical value that indicates the strength of an acidic or alkaline solution is called pH.

Additional MCQs

1. Sour taste of fruits and vegetable is due to various types of _____ present in them.

a. Salt b. Acids✓
c. Base d. All of them

2. Drain opener is an example of.

a. Salt b. Acids
c. Alkalies✓ d. All of above

3. Acid turns _____ litmus paper to red.

a. White b. Blue✓
c. Green d. yellow

4. All _____ are base

a. Alkalies✓ b. Acids
c. Salts d. Gases

5. Potash alum is an example of _____

a. Acid b. Base
c. Salt✓ d. None of them

6. Carbonic acid is formed by dissolving _____ in water.

A. Carbon dioxide✓ b. Carbon monoxide
c. Carbon d. All of the above.

7. Citric fruits contain _____

a. Citric acid✓ b. Malic acid
c. Tartaric acid d. Lactic acid

8. Apple contain _____

a. Citric acid b. Malic acid✓
c. Tartaric acid d. Latic acid

9. Grapes contains

a. Tartaric acid✓ b. Malic acid
c. Citric acid d. Lactic acids

10. Asprin contains _____

a. Acetylsaliaylic acid✓ b. malic acid
c. Tartaric acid d. Lactic acid

11. Ascorbic acid is used as _____

a. Vitamin A b. Vitamin C✓
c. Vitamin E d. Vitamin K

12. _____ Indicator gives pink colour in an alkali

a. Methyl orange b. Phenolphthalein✓
c. Litmus paper d. pH paper.

UNIT 8
FORCE AND PRESSURE

A. MCQs (Choose the correct options)

1. A Football is at rest on ground the forces acting it are.

a. Zero b. Balanced✓
c. Un balanced d. Uncountable

2. An object is moving in a circle uniformly the forces acting in it are

a. Zero b. Balanced
c. Un balanced✓ d. Uncountable

3. The unit of buoyant force is:

a. Pascal b. Newton✓
c. buoyancy d. pressure

4. Which of the following quantities is measured in units of Pascal?

a. Friction b. Buoyancy
c. Pressure✓ d. Force

5. Force applied per unit area gives.

a. Buoyancy b. pressure✓
c. Friction d. Net force

6. With depth, pressure in a liquid.

a. Decreases b. Increases✓
c. Stay the same d. Is zero

7. The atmospheric pressure will be lowest.

a. In Islamabad b. Lahore
c. Karachi d. on Top of K2✓

8. A Toy floats in a bathtub. The Buoyant force exerted on the toy depends on the volume of

a. Water in the bathtub b. The bathtub
c. The water displaced
d. the toy under water.✓

9. If a submerged object displaces an amount of liquid with a weight less than its own, when the objects is released, it will

a. Sink✓
b. Remain submerged in equilibrium
c. float d. pop up out of the surface

10. If the same-sized force is made to act over a smaller area.

a. The pressure is decreased
b. The pressure is not changed
c. The pressure is increased✓
d. The results depend on the shape of the surface.

B. Short Question

Q1. If there are many forces acting on an object, how can the net force be zero?

Ans. The net force is sum of all the force acting on an object. In case of many forces acting on the body. It can be in equilibrium, which implies zero external force.

Q2. Why steeping of high heeled shoe hurts more than a flat shoe?

Ans.. High heeled shoes or boots transfer the force through a much smaller area causing a much greater pressure. It will hurt more if a person steps on someone's foot in high heels than if they are wearing flat shoes.

Q3. Explain why objects moving in a liquid must have special shapes?

Ans. When object move in a fluid, they have a stream lined shape that will resist the motion of objects in the liquid by reducing the current. Moving objects in fluid must have special shapes because the drag force or the friction force depends on the objects shape.

Q4. Consider two identical pails of water filled to the brim. One pail contain only water, the other has a piece of wood floating in it. Which pail has the greater weight?

Ans. The buoyant force on the wood object equal the weight of the wood object (Static equilibrium) also, the buoyant force is equal to the weight of he spilled water;
In other words, the weight of the wood is the same as the weight of the spilled water. Therefore, putting the wood doesn't change the weight of the pail.

Q5. Why does the fish float in the middle of the water?

Ans. The swim bladder present in the fish, which act like an air-inflated balloon that can expand and contract depending on how much gas is inside. When the swim bladder expands it will increase in volume and therefore displace more water. This increase the fishes buoyancy and fish will float in the middle of water.

Q6. Why is atmospheric pressure greatest at the surface of Earth?

Ans. At earth (Sea level), air pressure is greatest because it is caused by the weight of the entire column of atmosphere at that attitude.

Explanation:

Air pressure is caused by the weight of the atmosphere pressing down on a location. At sea level, air pressure is greatest because it is caused by the weight of the entire column of atmosphere at that attitude increases, the column of atmosphere gets shorter, and so less weight is pressing down at given attitude. So, atmospheric pressure is reduced.

C. Long Questions

Q1. What is net force? How it affect the motion of an object?

Ans. **Net force:**

Definition:

The net force is defined as the sun of all the forces acting on an object is called net force.

Formula:

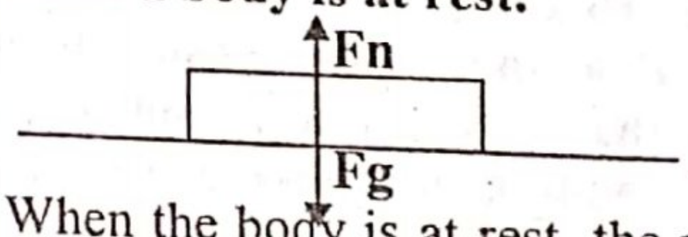
In N is the number of force acting on a body the net force formula is given by .

$F_{Net} = F_1 + F_2 + F_3$ --------F_N

Where

$F_1, F_2, F_3,$ ------- F_N is the force acting on a body .

a. Net force, Effect on the motion of body when a body is at rest.



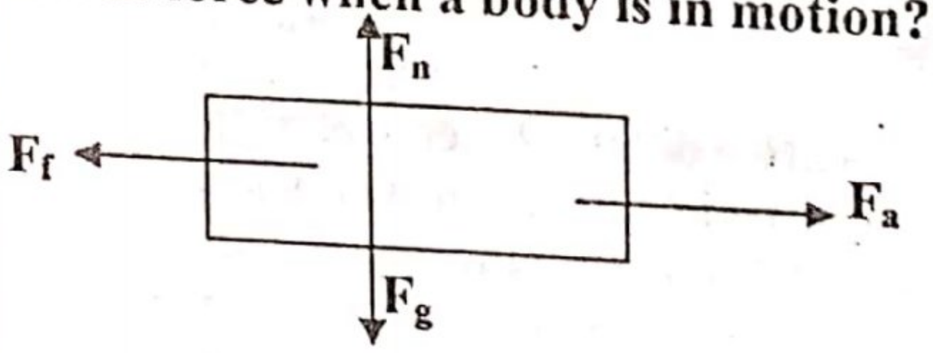
When the body is at rest, the net force formula is given by

$F_{Net} = F_a + F_g$

Where

F_a = applied force
F_g = Gravitational force

B. Net force when a body is in motion?



When is a force is applied to the body , not only the applied force acting, there are many other forces like gravitational force F_g, frictional force F_f and the normal force that balance the other force.

Therefore, the net force formula is given by.

$F_{net} = F_a + F_g + F_f + F_N$

Where

F_a is a applied force
F_g is a gravitational force
F_f is a frictional force
F_N Is a normal force.

Q2. How is pressure related to force an area?

Ans. **Pressure:**

Definition: The pressure is defined as the amount of force acting perpendicularly on the unit area of a body.

Mathematically:

Mathematically it can be written as:

Pressure = Force/ Surface area.

Explanation: Pressure is directly proportional to the forced and inversely proportional to the area, which means if force is increased p pressure, will be increase and if force is decreased, pressure will be decreased. If acting force covers greater area, less pressure will be produced and if acting force covers narrow area, greater pressure will be produced.

Q3. What is buoyancy? What determines the object to sink or float?

Ans. **Buoyancy:**

Definition: Buoyancy or upthrust, is an upward force exerted by a fluid that oppose the weight of a partially or fully immersed object.

Object to sink or float:

Object sinks or float due to its density. If an object is denser than water, it will sink when placed in water, and if it is less dense than water, it will float.

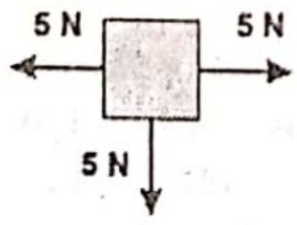
D. Constructed Questions

Q1. Determine the net force on each of the objects shown below. Don't forget to give the direction of the force.

1. 10N – 2N = 8N
8N towards right Side

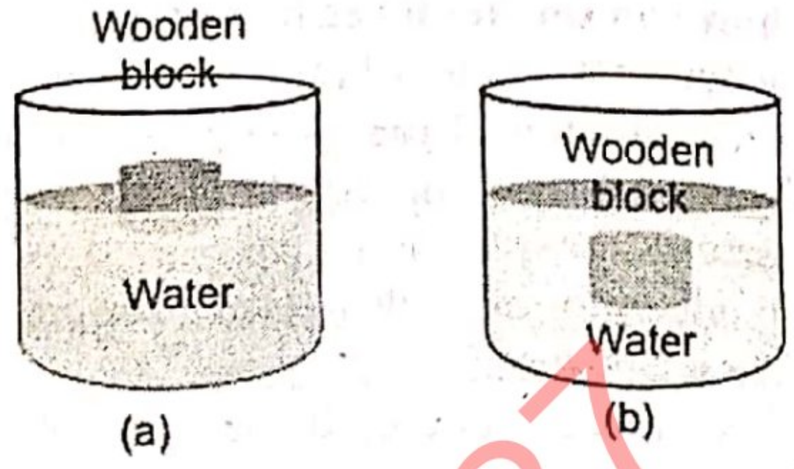
2. 8N -5N = 3N
3N towards left side.

3. 6N – 3N = 3 N
3N towards downward



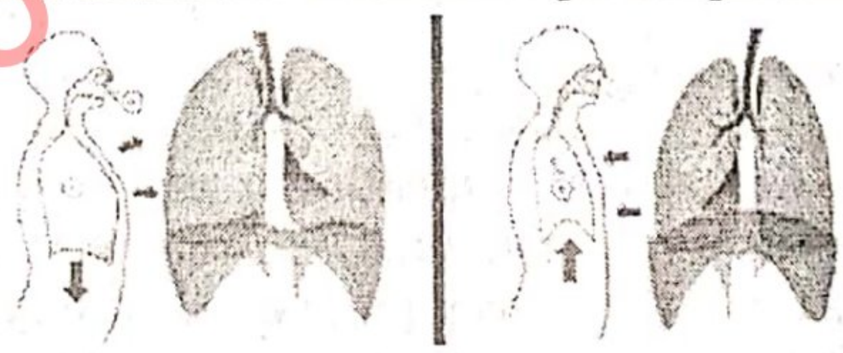
4. 5N- 5N +5N
= 0+5N = 5N
5N towards downward.

Q2. A block of wood on floating on the Surface of water as shown in figure (a) In Figure (b), the same block of wood is pushed beneath the surface of the Water. What will happen to the wood when the downward force in figure (b) is removed? Also draw the buoyant force in the figure.



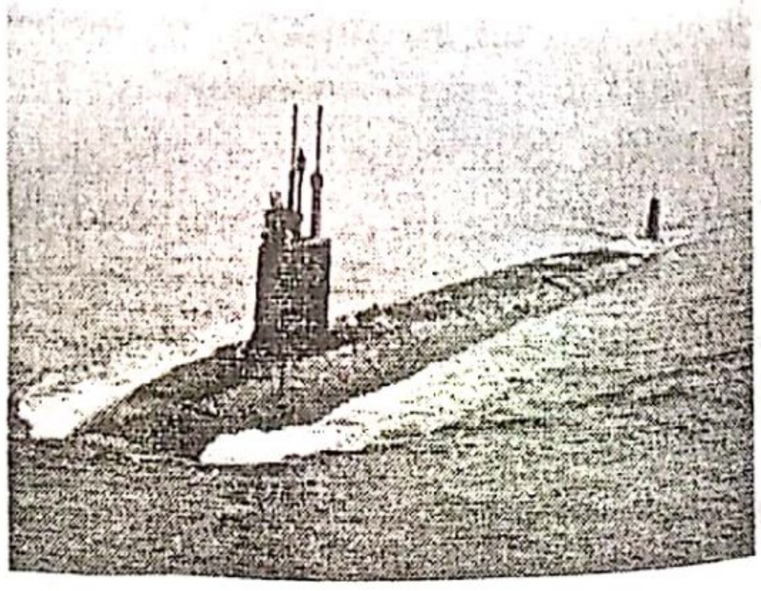
Ans. When the downward force on the wood in figure (b) is removed then buoyant force acts on the wood and the wood floats on the surface of water.

Q3. The pressure inside the lungs increases and decreases with each breath. When we inhale and exhale when is the pressure in the lungs greater than atmosphere pressure and when is it lower than atmospheric pressure?



Ans. The pressure inside the lungs increases and decreases with each breath. When we inhale and exhale. The pressure in the lungs greater than atmospheric pressure during exhalation and the pressure in the lungs lower than atmospheric pressure during inhalation.

Q4. A submarine is a type of ship that can travel both on the surface of the water and underwater. How submarine is able to both float and sink?



Ans. A submarine uses ballet tanks filled with compressed air and when needed air released and takes on water which increases the density making it sink but when the water is pushed out the submarine's density decreased making it float.

Additional Questions

1. If steel is denser than water. How can there ships float?

Ans. A steel ship floats is because of its shape. If the ship were just a big block of steel, it would sink very quickly however; ships are built with hollow shape. The hollow shape increases the volume that steel takes up without increasing the mass of the steel.

2. Why liquid pressure increase with the depth?

Ans. Liquid pressure increases with the depth; it acts equally in all direction on and depends on the density of the liquid.

3. Define friction?

Ans. Friction is the resistance to motion of one object moving relative to another.

4. Define pneumatics?

Ans. The study of behavior of gases under pressure is called pneumatics.

5. Why balloon burst when pricked with pin?

Ans. When you inflate a balloon, the air pressure inside it is much more than atmospheric pressure outside it. If the balloon is prickled, all the air tries to come out with great force. This small hole cannot allow so much of air to go out at once. Also, now there is weak spot in the membrane. The pressure due to air tears apart the rubber in an instant.

Additional MCQs

1. 1 Pascal is equal to

a. Nm b. Kg c. Cm^2 d. Nm^2✓

2. Experiment shows that pressure of gas depends upon.

a. Quantity and temperature✓
b. Density c. Volume d. Pressure

3. At sea level the mean density of air molecule is the

a. Maximum✓ b. Minimum
c. Average d. Zero

4. Pascal's law is only applicable to the

a. Metals b. Gases
c. Fluids✓ d. Solids

5. The pressure exerted by air is called

a. Water pressure b. Critical Pressure
c. Atmospheric pressure✓
d. Absolute Pressure

6. Steel is almost __ times denser than water.

a. Five b. Six
c. Seven d. Eight ✓

UNIT 9
REFLECTION AND REFRACTION OF LIGHT

A. MCQs (Choose the correct options)

1. A Ray of light is incident towards a plane mirror at an angle of 30-degrees with the mirror surface. What will be the angle of refraction?

a. 30^o b. 60^o✓ c. 90^o d. 45^o

2. If the angle of incidence is 45^o, then what will be the angle of reflection?

a. 0^o b. 45^o c. 90^o✓ d. 180^o

3. Which letter after reflection from a plane mirror will remain unchanged?

a. K b. E c. M✓ d. J

4. When light enters from air to water it.

a. Continue its path as straight line
b. Bends towards the normal✓
c. Bends away from the normal
d. Reflects totally.

5. The light passing from air to glass will cause the speed of light to.

a. Remain the same b. Increase
c. Decrease✓ d. Reduce to zero

6. For concave mirror real inverted image of same size is formed when an object is.

a. Beyond center of curvature
b. At center of curvature✓
c. Between centre of curvature and focus point
d. At focus point.✓

7. for concave mirror, no image formed when an object is .

a. Beyond center of curvature
b. At center of curvature
c. Between centre of curvature and focus point
d. At focus point.

8. To get an enlarge and upright image of the clock the correct time is.

a. Convex mirror✓ b. Concave mirror
c. Plane mirror d. Rough mirror.

9. The figure shows the plane mirror image of the clock the correct time is.

a. 2:35 b. 3:25✓ c. 8:05 d. 9:25

10. A dentist uses a small dental mirror to help magnify teeth in your teeth.

a. Convex mirror b. Concave mirror✓
c. Plane mirror d. All of these

B. Short questions

1. How can we see ordinary, non-luminous objects?

Ans, Ordinary Non-luminous objects reflects the light falling on them and the reflected light are sensed by the eye and thus we are able to see non-luminous objects.

2. Do you need a full-length mirror to see your hair and your feet at the same time? Does it depend on how far you stand from the mirror?

Ans. In order to see full image of a person, the minimum size of the mirror should be one half the persons height. This is so because, in reflection, the angle of incidence is equal to angle of reflection.

Example:

To see the image of a 6ft tall person, a 3 ft long mirror is required.

However your distance from the mirror doesn't matter to see full image.

3. What is the minimum number of mirrors needed to see back of your head?

Ans. The two mirrors needed to see your head. One is infront of your eyes and second at your back of your head.

4. At which position does the image and object has same magnification?

Ans. The image and object has same magnification at center of curvature.

5. Can a convex mirror produce a real image of an object?

Ans. No, a convex mirror can't produce a real image of an object. It always produces virtual image.

C. Long Questions

1. State laws of reflection. Discuss how a plane mirror forms a virtual image.

Ans. **Reflection:**

Reflection is a change in direction that takes place when light strikes a surface and rebounds.

Law of Reflection:

The law of Reflection describes the behavior of the incidents and reflected rays.

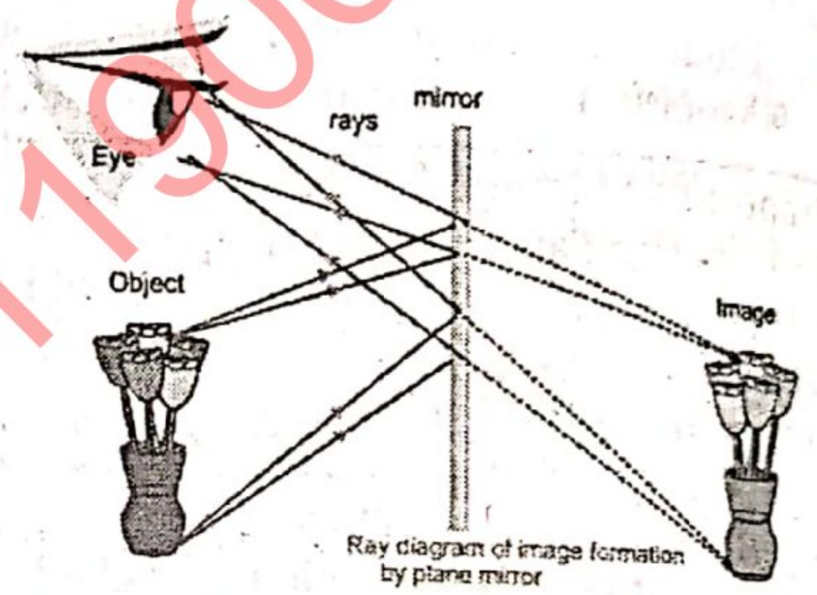
First law:

The incident ray, the reflected, ray, and the normal to the surface all lies in the same plane.

Second Law: The angle of reflection is equal to the angle of incidence.

Image formation by plane mirror:

When two light ways leaving the top of an object. These rays reflect from the mirror (angle of reflection equal to angle of incidence) and enter the eye. To the eye, it appears that the ray originates from behind the mirror, along the dashed lines. Similarly when the two rays leaving the button of object, therefore each point of an object, there is a single corresponding point on the image. All the rays that leaves a given point on the object, no matter what angle they have when strike the mirror, appears to originate from a corresponding point on the image behind the mirror.



Ray diagram of image formation by plane mirror

2. What is white light? How is the colour of light related to reflection and absorption of light?

Ans. **White light:**

An electromagnetic radiation of all the frequencies in the visible range of the spectrum, appearing white to the eyes is called white light.

Relation of Reflection and absorption of light:

The colour of the object or material is determined by the colour in light it absorb and those its reflect. An object has a colour of light that it reflects.

Example:

1. A Red apple absorber most of the colour of light but reflects red and apple look red.
2. Blue light fall on white piece of paper. The paper appear blue (not white) because only blue light was available for it to reflect.

3. Explain the image formation by convex and concave mirrors.

Ans. **Concave Mirror:**

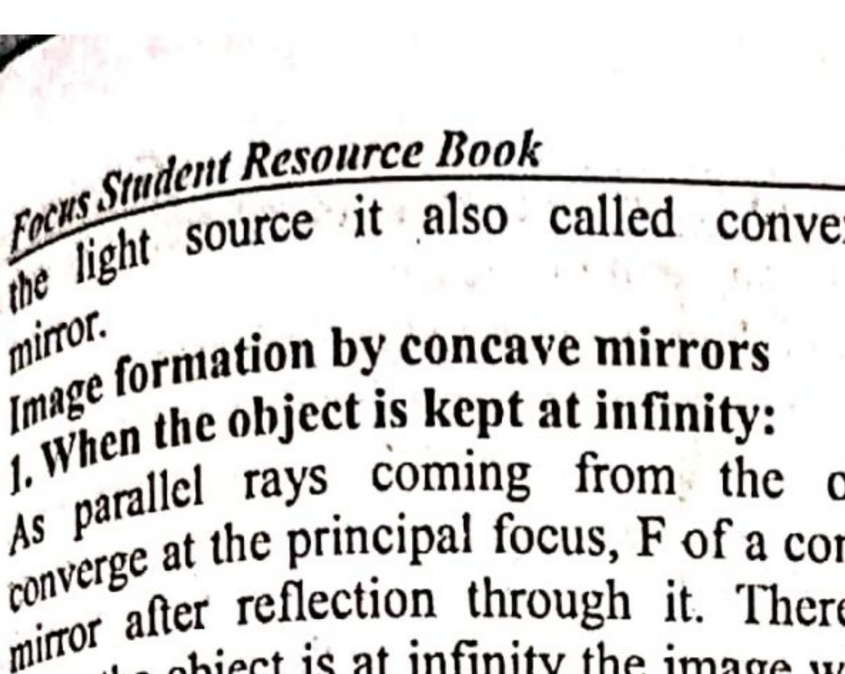
A concave mirror has a reflective surface that is curved inwards and away from

the light source it also called converging mirror.

Image formation by concave mirrors

1. When the object is kept at infinity:

As parallel rays coming from the object converge at the principal focus, F of a concave mirror after reflection through it. Therefore, when the object is at infinity the image will be form at F.



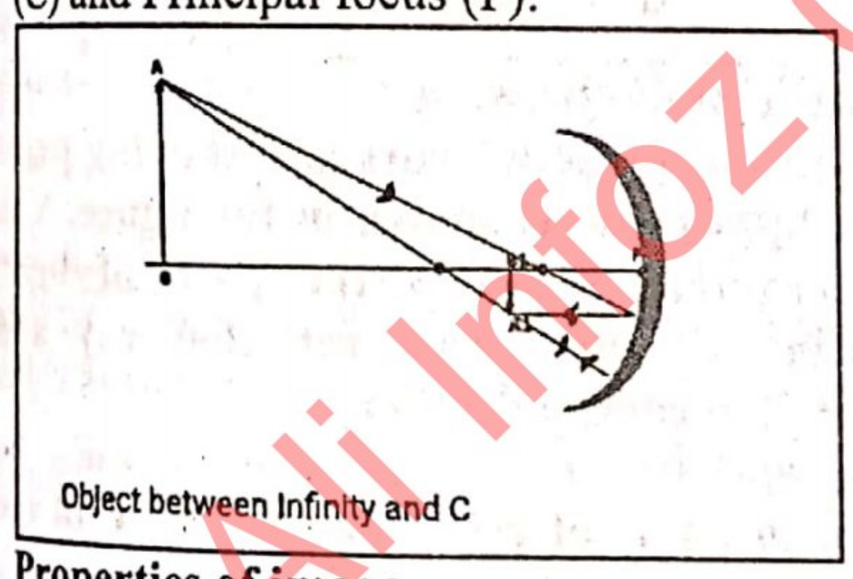
Object at Infinity

Properties of image formed

Real, enlarged and inverted image.

2. When the object is placed between infinity centers of curvature:

When the object is placed between infinity and the center of curvature the concave mirror than the image is between center of curvature (C) and Principal focus (F).



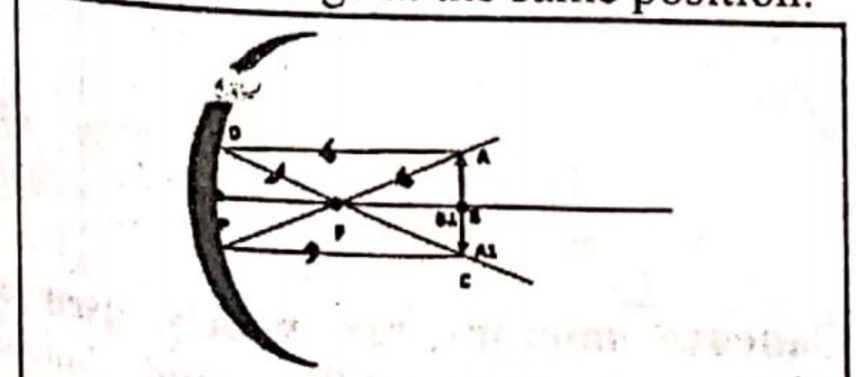
Object between Infinity and C

Properties of image

It is small size and inverted.

1. Object at center of Curvature (C).

Whenever we place our object at the center of Curvature of a concave mirror, we get a real and inverted image at the same position.



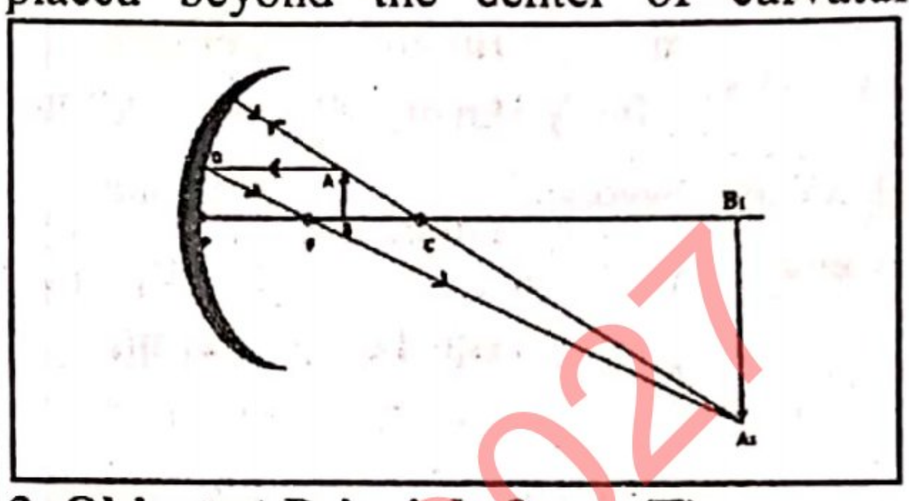
Object at C

Properties of image

It is same size as object and also real and inverted

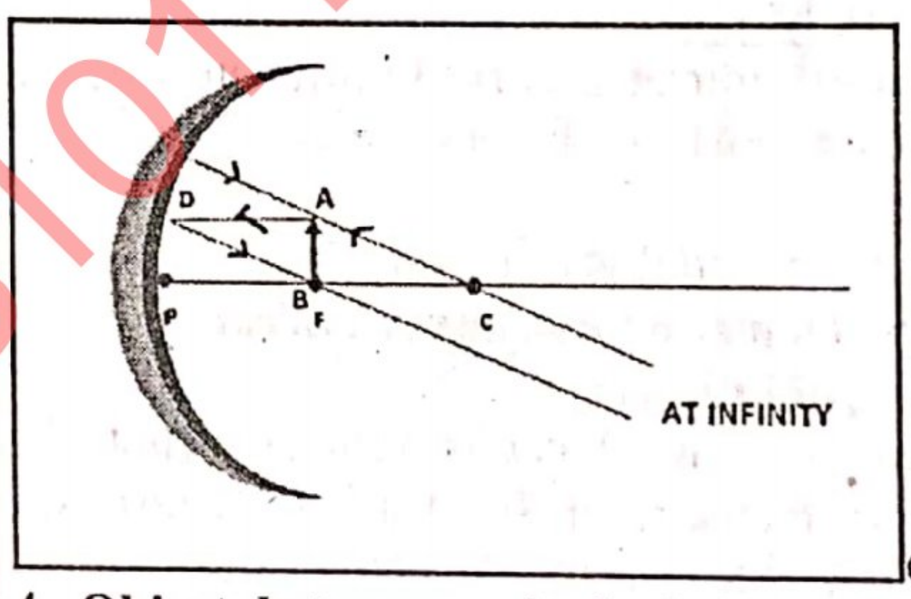
2. Object kept between the center of curvature (c) and Principle Focus (F)

When we keep the object somewhere between the center of curvature and the principle focus of the concave mirror, a real image is formed placed beyond the center of curvature (c)



3. Object at Principle focus (F)

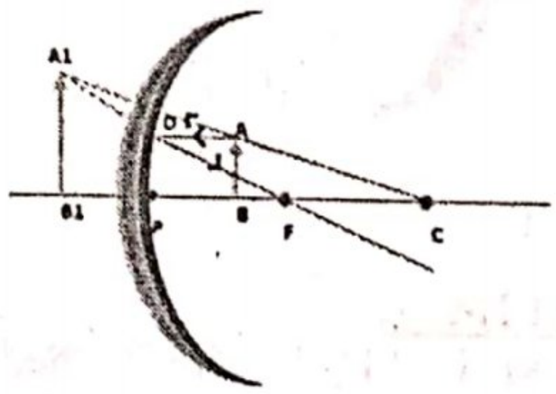
When the object is placed at the principal focus (F) of a concave mirror, a highly enlarged image of object is formed at infinity.



C

4. Object between principal force (F) and Pole (P).

When the object is placed any where between the principal focus and the pole of a concave mirror, we get enlarged, virtual and erect image formed behind the mirror.



Object between F and P

Properties of image:

Enlarged, virtual and erect

Position of object	Position of image	Image Size	Nature of image
Within focus(Between P and F)	Behind the mirror	Enlarged	Virtual and erect
At focus	At infinity	Highly Enlarged	Real and Inverted
Between F and C	Beyond C	Enlarged	Real and Inverted
At C	At C.	Equal to object	Real and Inverted
Beyond C	Between F and C	Diminished	Real and Inverted
At Infinity	At focus (F)	Highly Diminished	Real and Inverted

Convex Mirror

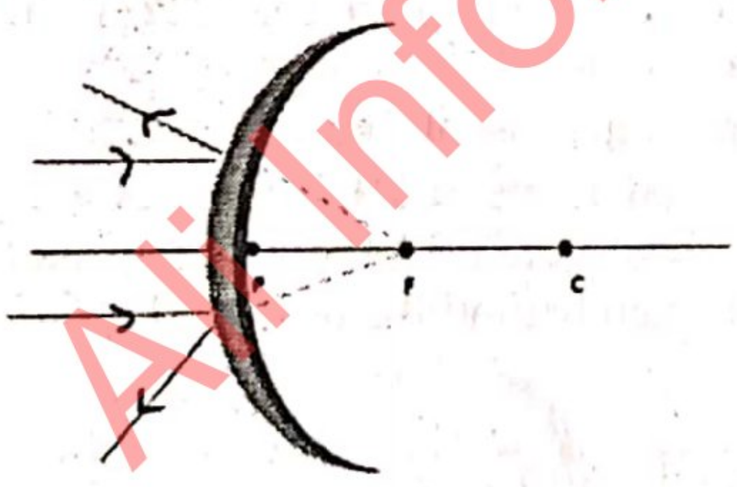
A convex mirror is curved mirror in which the reflected surface bulges towards the light source.

It is also called diverging mirror.

Image formation by convex mirror.

Object of infinity:

When ever the object is kept at infinity, we observe that a point-sized image is formed at principle focus behind the convex mirror.



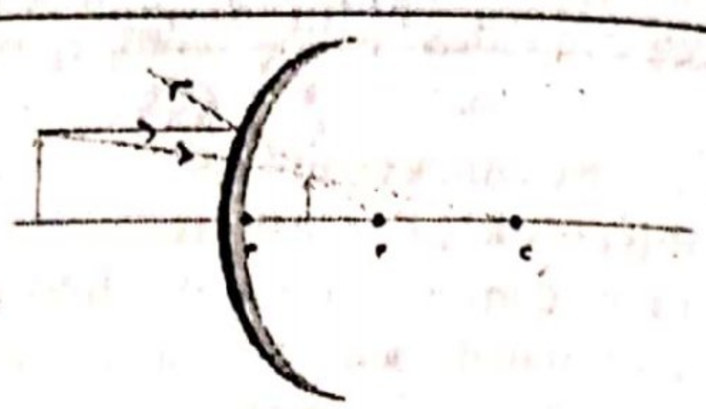
Object at infinity

Properties of Image

Image formed is highly diminished in size, virtual and erect.

Object is kept between infinity and Pole:

When ever the object is kept anywhere between the infinity and the pole of a convex mirror, than we get a dimished, virtual and erect imaged formed between the pole and focus behind the mirror.



g. Object between infinity and P

Properties of images.

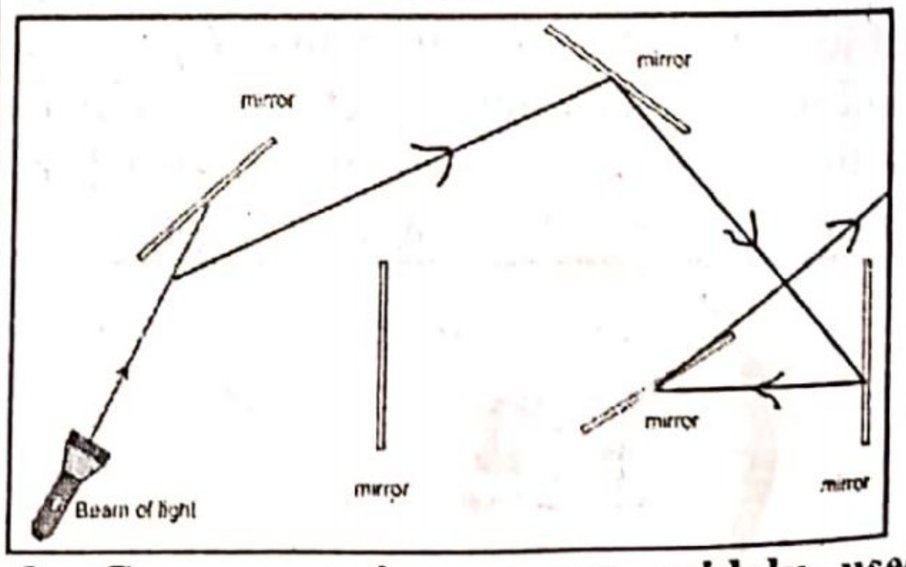
Image formed is diminished in size as well as virtual and erect.

Position of Object	Position of image	Image of Size	Nature of Image
Anywhere between pole P and Infinity	Behind the mirror between P and F	Diminished	Virtual and erect
At infinity	Behind the mirror at Focus (F)	Highly Diminished	Virtual and erect

D. Structured Question

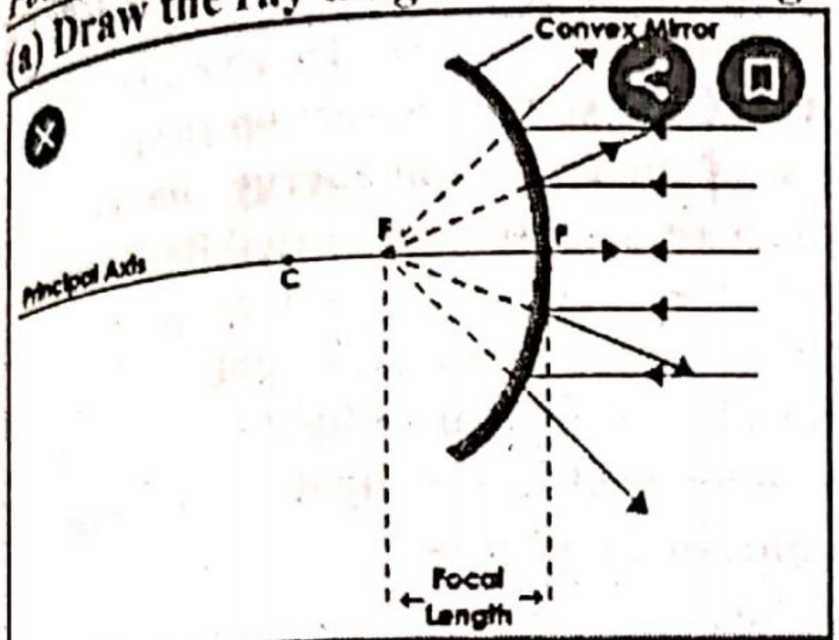
1. Series of plane mirrors and starting point for a light beam is shown in the figure. You are required to draw the path of light, showing (incident ray, reflected ray and normal) in each reflection.

Note that the angle of incidence must be equal to angle of reflection and that all the mirrors may not be used



2. Concave mirrors are widely used in headlights of automobiles and motor vehicles, torch lights, etc. as reflectors. The light source is placed at the focus of the mirror

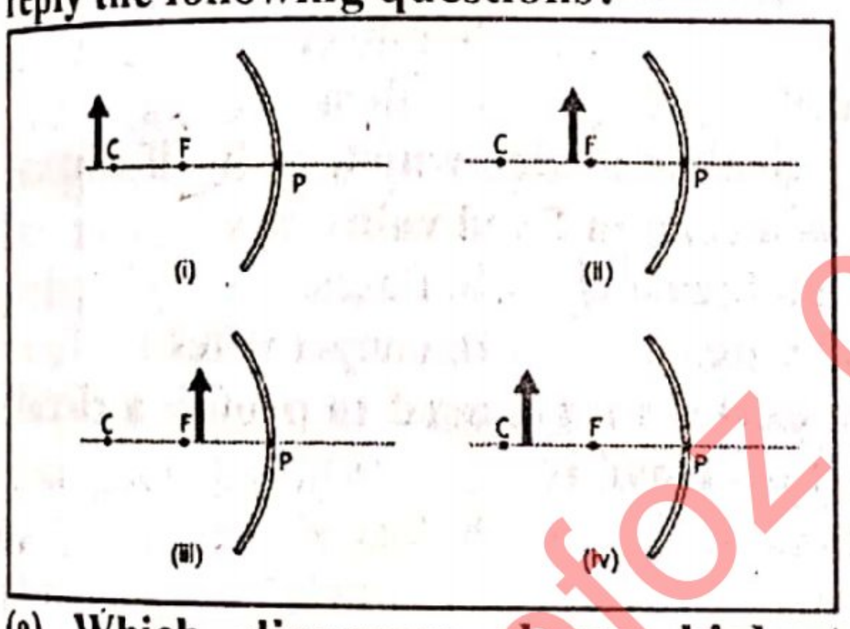
(a) Draw the ray diagram of this design?



(b) What is the advantage of placing bulb at the focus of concave mirror?

Ans. The advantage of placing bulb at the focus of concave mirror is that the light rays after getting reflected at the concave mirror, the reflected rays can cover large distance with high intensity.

3. Concave mirrors with object position are shown in the figure given below. Draw the ray diagram for the image of the object and reply the following questions?



(a) Which diagrams shows highest and lowest image magnification?

Ans. The diagram (1) shows lowest images magnification while diagram (ii) shows highest image magnification.

(b) In which diagram the image is upright and virtual?

Ans. Diagram (iv) shows the image upright and virtual.

4. Qurat-ul-Ain is wearing glasses with red colour filter, as shown in the figure below.

(a) She uses red filter to look at the lamp that gives white light, but the lamp appear red. Explain how this is possible.

Ans. Red filters only allows red colour to pass through it blocks all other colours. When white light fall on red colour filter than red filter glasses only allows red light to reflect back. All other colours of white light will be absorbed.

(b) Now she looks at red light lamp with red filter on her glasses. What colour will the lamp appear to her?

Ans. When she looks at red colour lamp through red filter glasses then lamp appears red because filter will allow the red light to pass.

(c). What colour will a green light appear to her when she is wearing her red filter glasses. Why?

Ans. Lamp appears black because green light will be absorbed as red colour filters absorbs all others colours except the red one. So green light will be blocked/absorbed by red filter glasses.

Additional Questions

Q1. Describe Euclid law of reflection?

Ans. The ancient Greek Mathematician Euclid described the law of reflection in about 300Bc. This states that

'Light travels in straight lines and reflects from surface at the same angle at which it hits it.

Q2.Discuss characteristic of images in plane mirror?

Properties of Images in plane mirror

Properties	Values	Plane mirror
Magnification	Larger Same size Smaller	Same size
Position	Measured from optical device	Same distance
Attitude	Upright Inverted	Upright
Type	Real Virtual	Virtual

3. What is periscope?

A periscope is an optical instrument that uses mirrors to reflect images through a tube. A periscope is an instrument to monitor over, around some obstacle or condition.

The simplest type of periscope consists of a tube at the ends of which are two mirrors. The mirrors are placed at an angle of 45 degrees, so that when light falls on one of the mirrors, then

it gets reflected back making it fall on the other mirror.

The second mirror further gets reflected back to the observer's eyes. The longer or narrower the tube, the smaller the field of view.

Periscope have wide range of applications. Periscopes are used in the submarines to see what is going on the water surface. Similarly, these are in use on battlefields to look out of trenches safely without exposing the body of the observer. They are also used in tanks and other armed vehicles.

4. If black is not a colour of the visible light, why some objects still looks blue?

Ans. When people see the colour of an object to be black, he is actually seeing an object that has absorbed all the colours and has reflected almost none. This absence of colour is what human eye recognizes as black colour.

Activity

If you have a make-up or shaving mirror at home, hold it up to view your image in the mirror as you back away from it across the room. What do you observe?

When you first move away from the mirror, the image of your face is upright and gets larger, then it disappears. As you continue moving away, your image re-appears but it is now upside down. When you still continue to move away from the image gets smaller and smaller.

Additional MCQs

1. A line passing through center of curvature, optical center and priciplal focus is called,

a. optical center b. Focal length
c. Focal length d. Principal axis✓

2. The image formed by a concave lens is always.

a. Virtual✓ b. Real c. Inverted d. Large

3. The change in the direction of light passing from one medium to another is called

a. Reflection b. Refraction✓
c. Dispersion d. None of these

4. When the object lies between F and O, rays after refraction.

a. Diverge✓ b. Coverage
c. Both a and b d. None of them

5. _____ is the point at which the incident rays strikes at the reflecting surface.

a. Normal point b. Incident point✓
c. Reflected point d. Refracted point.

UNIT 10
ELECTRICITY AND MEGNETISIM

A. MCQs (Choose the correct option)

1. Which of the following energy conversions takes place in a battery-operated flashlight?

a. Electrical → mechanical → light
b. Chemical → mechanical → light
c. Chemical → electrical → light✓
d. Nuclear → electrical → light

2. The unit of current is

a. coulomb. b. volt.
c. ohm. d. ampere.✓

3. Bulb is connected to voltage source, by increasing the voltage the brightness of the bulb will

a. Increase.✓ b. decrease.
c. reduce to zero. d. stay the same.

4. The primary purpose of a resistor is to

a. Increase Current. b. Limit current.✓
c. produce heat. d. resist current change.

5. The wire made from which of the following material is a conductor

a. glass. b. rubber.
c. gold.✓ d. silica.

6. The electric device which melts, if current exceeds a certain fixed value, are

a. Circuit breakers. b. Fuses.✓
c. earth wires . d. copper wires.

7. The device that is used to protect a circuit against overload is

a. heater. b. fuse.✓
c. lamp. d. switch.

8. To prevent risk of electric shock the earth pin on a three-pin plug is connected to the part of device

a. Plastic part of device.
b. Neutral wire.
c. Cable grip.
d. Metal case.✓

9. To increase the strength of the electromagnet the best core material should be

a. Plastic. b. Rubber.
c. Aluminum. d. Iron. ✓

10. Electromagnetic device which make of electromagnet is

a. Resistor. b. Bulb.
c. Door bell.✓ d. Three plug pin.

B. Short Questions

Q1. Why electrical devices need two conducting paths from a voltage source to operate?

Ans. Electrical devices needs two conducting paths from voltage source because as we know that current flows from high potential to low potential. That's why one wire should be at high potential and other is at low.

Q2. Why do wires usually warm up when an electric current passes through them?

Ans. Due to the wire having electrical resistance, which means that they resist the motion of electron, the electrons bump into atoms on the outside of the wire, and some of kinetic energy is given to the atoms as thermal energy. This thermal energy causes the wire to heat up.

Q3. During a floor grinding and polishing repairs in your house, the fuse blows when the operator start his heavy machine. He wants to replace a fuse by a piece of wire. Would you agree? Give reasons for your response.

Ans. During a floor grinding and polishing repair in your house, the fuse blows when the operator start the machine. He wants to replace a fuse by a piece of wire but there is a risk of brining out of heavy machinery and other electrical appliances because heavy machine of operator draws excessive or large amount of current which may cause excessive heating effect and will further damage the device too. So he should replace the fuse by a circuit breaker (they are extremely reliable than that of fuse.

Q4. Explain why is it dangerous if we use hair dryer in a bath tub?

Ans. It is dangerous if we use hair dryers in a both tub because one only gets electrocuted when the human body in completing an electrical circuit. In the bath tub, unless one is bathing is in distilled water, the bath water is more conductive then the human body and the current would flow from the hair dryers to the ground through the water.

Q5. What advantage will a crane have with electromagnet over other cranes? Can it use a permanent magnet?

Ans. Without doubt the biggest advantages of electromagnets in cranes are the versatility. Crane having electromagnet have the magnetic field that can be quickly changed by controlling the amount of electric current in the winding.

C. Long questions

1. What is resistance and in what units we measure resistance?

Ans. **Resistance:**

The measure of opposition to the flow of current is called resistance.

Mathematical form:

The voltage of Resistance R is therefore obtained by dividing the voltage V by the current I it carries.

Resistance = voltage/Current

$$R = \frac{V}{I}$$

Explanation:

Resistance lowers the flow current. If a material offers a small resistance less, voltage would be required to push current through the current of a resistance, then more voltage will be required to push the same current through the circuit every material offers some resistance to the flow of current through it.

Categories:

Different material have different resistance, and therefore can be broadly divided into two categories

i.c conductor

Insulator

Conductor;

A Conductor a substance or material that allows electricity to flow through it.

Resistance and conductor:

An electric conductor has low resistance

Example:

Gold, Silver, Copper and Aluminum

Insulator:

A insulator is a substance material doesn't allows electricity to flow through it.

Example:

Plastic, glass, rubber and cloth.

Unit of Resistance:

The SI Unit of resistance is ohm and is represented by Greek word omega (Ω)

Ohm:

The resistance of wire is one ohm if potential differences of one volt is applied across its ends and causes a current of one ampere to flow through it

$$1\Omega = \frac{1V}{1A}$$

2. State and explain electric power by giving its mathematical description.

Ans. **Electrical Power:**

Definition: Electrical power is the rate at which electrical energy is used in a circuit

Or

The rate at which electrical work is done is called electric power

Mathematical form:

Electrical power (P) is the product of total current (I) in and voltage (V) across a circuit

$P = I \times V$

Explanation:

When a change moves a circuit, it loses energy. This energy is transferred into work, such as the burning of motor, and is lost as heat in a circuit.

Unit of Power:

The SI unit of power is the watt (W)

Wah:

A wah is equipment to

IA x IV

Example:

1.An electric LED bulb might be rated as 12 W.

2. A Typical hair dryer might be rated at 2000 W.

3. What are electromagnets? Explain their uses in daily life.

Ans. **Electromagnetic:**

Electromagnet is a coil that has a soft iron core that acts as a magnet when an electric current in the coil.

Strength of electromagnet:

The strength of electromagnet increases with increasing the current, increases the number of turns in coil.

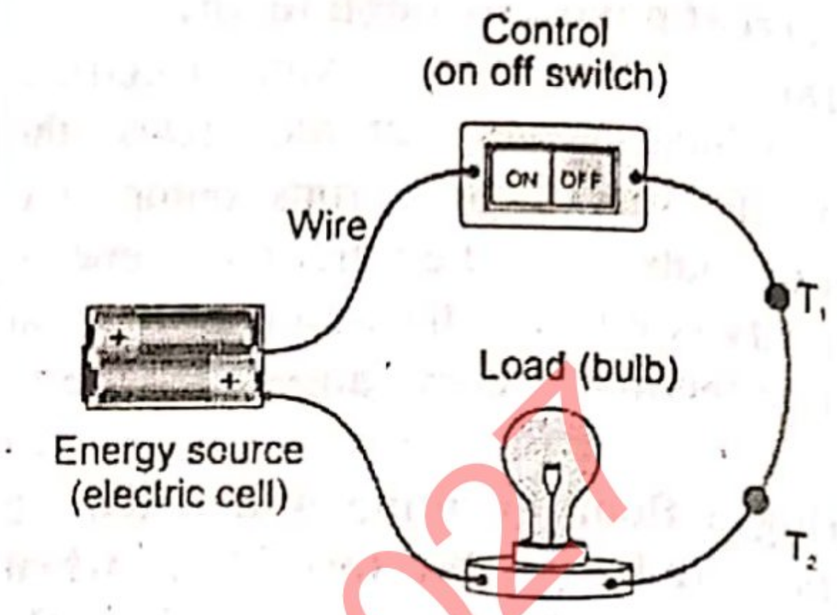
Use in daily life:

Electromagnets are founding

- Door bell
- Hard drives
- Speakers
- Anti shop lifting system
- MRI machines
- Home security system
- VCRs
- Tape decks
- Motors
- Magnetic locks
- Induction cookers
- Generators, motors and transformers
- Mass spectrometer etc.

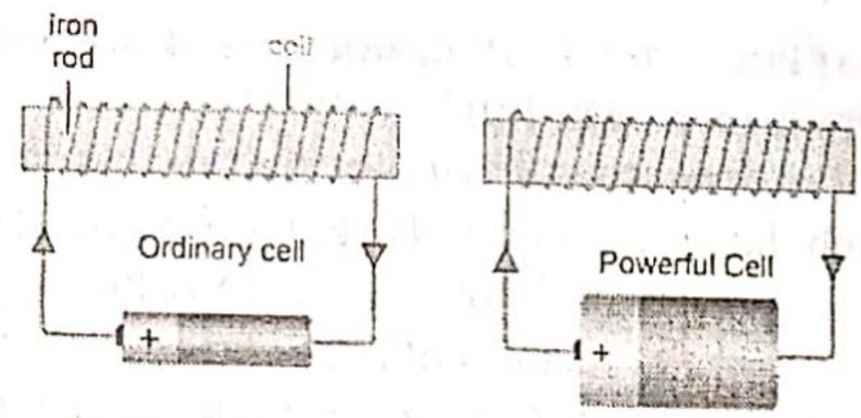
D. Structured questions

Q1. There is different resistance to flow of current by different materials. Consider the circuit shown in figure having two terminals T_1 and T_2 .T When copper wire is connected between the terminals and switch is on the bulb glows. When Nichrome wire and plastic string having same thickness as copper wire replaces it, how would the glow change in each Case?

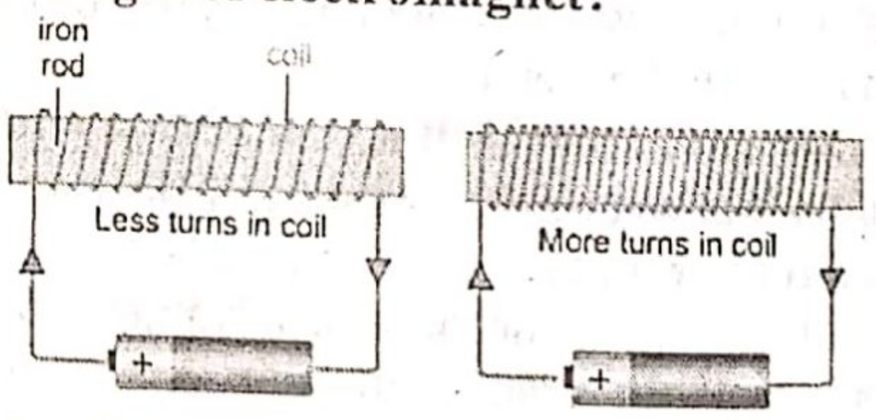


Ans. There is different resistance to flow of current by different materials. Consider the circuit having two terminals T_1 and T_2 when copper wire is connect between the terminals and switch is on the bulb glows. When plastic have same thickness as copper wire replace it, the bulb doesn't glow because plastics is a insulator and has high resistance due to which electricity doesn't pass and doesn't allow bulb to glow. But Nichrome is a conductor so when copper is replaced by Nichrome it allows current and bulb glows.

Q2. Electromagnets with different arrangements are shown in the figure.



A. Why the powerful cell increases the strength of electromagnet?



Ans. The powerful cell increases the strength of electromagnet because as we know that powerful cell produces more current and increases the strength of electromagnet.

B. What effect has the number of turns in the coil on the strength of electromagnet?

Ans. The strength of an electromagnet can be increased by increasing the number f turns in the coil around the iron core.

c. How the strength of electromagnet will change if we increase the thickness of wire or size core?

Ans. The strength of electromagnet will increase if we increase the thickness of wire or size core because per unit area more electrons will pass through a thicker wire.

Additional Questions

Q1. Enlist four characteristics on which resistance of wire depends?

Ans. The resistance of wire depends on four characteristics given below.

1. Type of material 2. Length of wire
3. Cross sectional area 4. Temperature.

Q2. What remedy should be done to avoid electric shocks in electrical devices?

Ans. To avoid the risk of electric shocks, the metal body of an electric appliances is earthed or grounded. The current of the equipment passes to the earth, which has zero potential, this protecting the system and equipment from damaged.

Q3. What is the meaning of earthing?

Ans. Earthing means to connect metal case of an electric appliances (the neutral parts of the supply system)

Q4. Define Voltage?

Ans. The difference of electric potential between two points is termed as voltage.

Q5. Define current?

Ans. The rate of flow of charge is called current.

Q6. Define resistance?

Ans. The measure of opposition to the flow of current is called resistance.

Q7. Define resistor?

Ans. A Devices intended to after resistance is called resistor.

Additional MCQs

1. One Ampere is equal to

a. $1A = \frac{1C}{1S}$✓ b. $1A = \frac{1V}{1S}$

c. $1A = \frac{1V}{1C}$ d. $1A = \frac{1C}{1V}$

2. The unit of resistance is

a. Second b. Current
c. Ohm✓ d. Ampere

3. Which one is insulator

a. Aluminium b. Nichrome wire
c. Copper wire d. Rubber✓

4. _____ Is an electrical safety devices used to present overloading in high current drainage

a. Resistor b. Conductor
c. Insulator d. Fuse✓

5. The strength of electromagnet _____ with increasing the current.

a. Increase✓ b. Decreases
c. No effect d. None of above

UNIT 11
TECHNOLOGY IN EVERY DAY LIFE

A. MCQs (Choose the correct option)

1. Which of the following is NOT a component of toothpaste?

a. Glycerine b. Baking soda
c. Lye✓ d. Salt

2. Which substance is used to make milk plastic?

a. Baking soda b. Glycerine
c. Vinegar✓ d. Borax

3. What type of mirror is used in solar cooker?

a. Plane b. Convex
c. Concave✓ d. Flat

4. A wind turbine converts the wind kinetic energy into

a. heat. b. Electricity.✓
c. thermal energy. d. solar energy.

5. In making soap, when lye is completely dissolved, the solution is left to cool to

a. 50° C. b. 100° C.✓
c. 5° C d. 10° C

B. Short questions

1. What is the most important material in toothpaste?

Ans. The most important material in toothpastes is alkali, so toothpaste neutralizes acid and prevent tooth decay.

2. Why does milk turn into plastic when vinegar is added to it?

Ans. When milk is mixed with an acid (vinegar) casein molecule combines to form long chain product called casein plastic. This plastics can be scooped up and molded

3. What is Saponification?

Ans. When oil or fats are heated with an alkali NaOH, Sodium salts of fatty acids are formed.

This reaction is known as saponifaction reaction

4. Why it is better to use concave mirror rather than convex mirror in solar cooker?

Ans. It is better to use concave mirror rather then convex mirror in solar cooker because concave mirror coverage the light rays to form a point on the reflecting surface. When the light rays coverage to spot the intensity of the rays increase produce heat.

5. What are the advantages and disadvantages of using a solar cooker? Are there places where solar cookers would have limited utility?

Ans. **Advantage of solar cooker:**

The advantage of solar cooker is given below;

- High performance
- No fuel
- Eco – friendly
- One time investment

Disadvantages of solar cooker:

The disadvantages of solar cooker are given below.

- Can't be used in cloudy weather.
- Take longer time to cook.
- They need to learn special method to cook.

Places where solar cooker have limited utility:

Solar cookers have limited utility at places that remains cloudy or have longer winter e.g Hilly areas.

6. What potential you see for the solar cooker to be used in Pakistan?

Ans. Pakistan has tremendous potential for use of solar cooker In Pakistan. Solar cooker international declared Pakistan at No 3. For use of solar cooker potential.

7. When can wind power be used?

Ans. Wind energy pr wind power is the process by which the wind is used to generate mechanical power to electricity this mechanical power can be used for specific tasks (such as grinding grain) or pumping water) or a generator can convert this mechanical power into electricity.

8. Why might engineers be interested in developing wind power?

Ans. Engineers might be interested in developing wind power because wind power is undergone the fastest rate of growth of any form of electricity generation in the world. Wind power is emission free renewable and cost free, however, the amount of electricity generated and obtained by wind energy conversion system in still unsteady, relatively expensive and difficult to integrate into traditional electrical. System because by variation of the variation in wind source and unresolved energy storage is use.

9. If you want to install a windmill for your home, where will you place your wind turbine?

Ans. If you want to install a wind mill for your home, a turbine is installed according to a general rule of thumb is to install a wind turbine on a tower with a bottom of the rotor blades at least 30 feet (9 meter) above any obstacle that is within 300 feet (90 meters of the tower.

C. Long questions

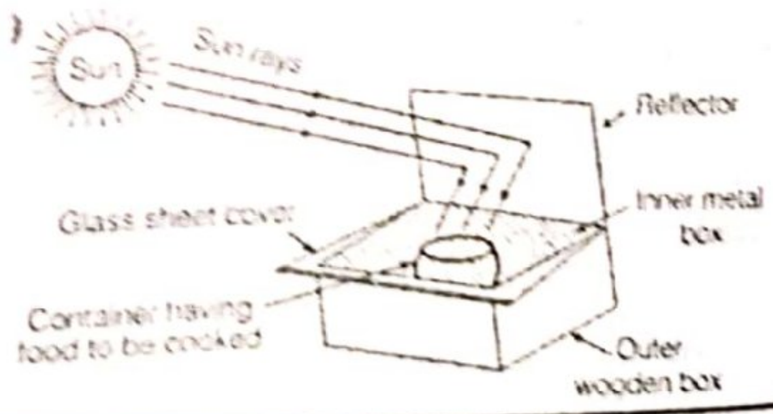
1. What is spherical mirror type solar cooker? How it can be used to cook food?

Spherical mirror type of solar cooker

Spherical mirror type solar cookers is device that use the energy of sunlight to heat or cook food by the help of concave mirror.

How food can be cooked?

The food is cooked in a shallow vessel of the containers the box has a transparent covering of glass sheet over it the glass is concave mirror which traps light particles and generates heat. The solar cooker is placed is sunlight and then reflector is adjusted in such a way that a strong beam of sunlight enters the box through the glass sheet.



2 What is a wind turbine? How it is used to produce electricity.

Ans **Wind Turbine:**

A wind turbine is a device that converts the kinetic energy og wind into electrical energy.

How Wind turbines produces electricity

Wind turbines uses blades to collect the winds kinetic energy wind flows over the blades creating life (similar) to the effect of aero plane wings) which caused the blades to turn the blades are connected to a drive shaft that turns an electric generator which produce electricity.

3. What is UPS? Where and how is it used?

Ans. **UPS:**

Ups stand for uninterruptible power supply Or. Uninterruptible power source.

Definition:

Ups is an electrical device that provides energy power to a load when the point power source or main power fails.

Explanation:

A ups allows for the safe, orderly shutdown of a computer and other equipment connected. The size and design of a ups determine how long it will supply power.

Uses:

Ups uses battery control interruption in power supply. It detects loss or reduction in power supply source, the control is transferred to the batteries and DC voltage in batteries is converted to AC using. An inverter for the devices that runs using AC.

Additional Questions

Q1. Why it is not recommended to leave the cooking meal unattended in solar parabolic cooker?

Ans. Solar parabolic cookers heat up fast and get very hot, thus they are ideally suited for grilling, boiling, steaming, frying etc. Because of the high heat, the rapid cooking, and the movement of the sun across the sky, it is not recommended to leave the cooking meal unattended.

Q2. How toothpaste can be made?

Materials Required:

- Glycerin 2 teaspoon
- Baking soda 3 teaspoon
- Peppermint oil 5 drops (optional)
- A pinch of salt

Procedure:

- Mix baking soda and salt in a mortar or any ceramic container.
- Add glycerin in it.
- Blend with pestle or spoon until you get a paste.
- Add few drops of peppermint oil or any other flavoring.
- Your toothpaste is ready.

Q3. What is the use of plastic ties?

Ans. Plastic ties (known as cable ties) can be used to keep the plywood petals together. It can be easier to fix the petals gradually from the centre of the edges of the parabola.

Additional MCQs

Choose the option

1. Generator is a device that converts chemical energy into

a. Mechanical✓ b. Heat
c. Wind d. Sand

2. The electric current which is used in our home is

a. C A b. A.D c. D.C d. A. C✓

3. The device which converts Ac to Dc is _____

a. Silicon chip b. Amplifier
c. Processor d. Diode✓

4. A _____ is a component that resists the flow of current.

a. Resistor✓ b. Capacitor
c. Diode d. Transistor

5. The ongoing magnetic field produces electric current. This fact was first discovered by.

a. Michel Farady
b. Hans Christina oerstad✓
c. Lenz d. Newton.

UNIT 12
OUR UNIVERSE

A. MCQs (Choose the correct option)

1. The distances in space are measured in

a. meters. b miles.
c light years.✓ d. kilometers.

2. Milky Way galaxy is classified as

a. spiral galaxy.✓ b elliptical galaxy.
c. irregular galaxy. d. spherical galaxy.

3. With no or very little star formation, galaxy is called

a spiral. b. elliptical.
c. Irregular.✓ d spherical.

4. When the mass of star is equal to our sun it will turn into

a white dwarf.✓ b neutron star.
c. black-hole. d singularity.

5. During star formation the stars are prevented to collapse under gravity by a

black holes. b. other stars.
c mass of gases. d nuclear reactions.✓

6. A pulsar is type of

a. white dwarf. b. neutron star.✓
c black hole. d red giant.

7. To form a black hole, the initial mass of the star in solar masses should be

a. 0.5 b. 1 c 3✓ d. 7

8. The total life of sun (from birth to its death) is

a. 100 million years. b. 4.6 billion years. ✓
c 5 billion years. d 10 billion years.

9. Optical telescopes make use of

a. X-rays. b infra red light.✓
c Visible light. d. Radio waves.

10. The unmanned object launched into space to study celestial objects is

a. Steatite. b Star.
c. Space probe.✓ d. Space telescope

B. Short questions Give short answers to the following questions

Q1. Why are distances in space often measured in light years?

Ans. The light year is used to measure distance in space because the distance are so big that a large unit of distance is required.

Q2. Is our sun in motion through space?

Ans, Yes, the sun does moves in space. The sun and the entire solar system revolves around the center of our own galaxy – the milky way.

Q3. What is the source of the Sun's energy?

Ans. The source of sun's energy is Nuclear fusion reaction between hydrogen and helium.

Q4. Why the Sun will not become a black hole?

Ans. The Sun will not become a black hole because the sun would need to be about 20 times more massive to end its life as black hole.

Q5. What are the advantages of designing Space probes for not to return back to earth?

Ans. The advantages of designing space probes for not to return back to earth are;

(a) They can go further away from earth and can travel for longer periods

(b) They don't need extra room for life support.

(c) It is the tool that they carry on them that gives us so much information about objects in the solar system.

C. Long questions

Q1. What are galaxies? Explain different types of galaxies.

Ans. **Galaxy:**

A Galaxy is a huge collection of gas, dust and billion of stars and their solar system.

Types of galaxies:

Spiral galaxies

Spiral galaxies are the most common type in the universe. Our Milky Way is a spiral galaxy, as is the rather close-by Andromeda Galaxy. Spiral galaxies are large rotating disks of stars and the central bright region at the core of a galaxy is called the 'galactic bulge'. Many spirals have a halo of stars and star clusters above and below the disk.

Elliptical galaxies

Elliptical galaxies are roughly egg-shaped (ellipsoidal) and have no galactic bulge at their centers. Most elliptical galaxies contain old stars as there is little new star formation occurring in them. Elliptical Galaxies can have as few as a hundred million to perhaps a hundred trillion stars, and they can range in size from a few thousand light-years across to more than a few hundred thousand.

Irregular galaxies

Irregular galaxies are as their name suggests are irregular in shape. They have no definite shape, however like all galaxies; they are in constant motion as a group. Such irregularities in spiral and elliptical galaxies are also observed.

The Milky Way galaxy Our own solar system is a small part of the Milky Way galaxy shown in figure 12.4, just one of many observable galaxies. Milky Way galaxy is larger than average galaxies, both in its number of stars and dimensions. Milky Way galaxy contains roughly 400 billion stars. It has a diameter of about 100,000 light years and a thickness of about 2000 light years in the arms. Its central bulge about 10,000 light years across. Our Sun, which is a star like many others, is located about halfway from the galactic center to the edge, some 26,000 ly from the center

Q2. How do stars form? What stages does a star pass through? Why do some stars end up as white dwarfs, and others as neutron stars or black holes?

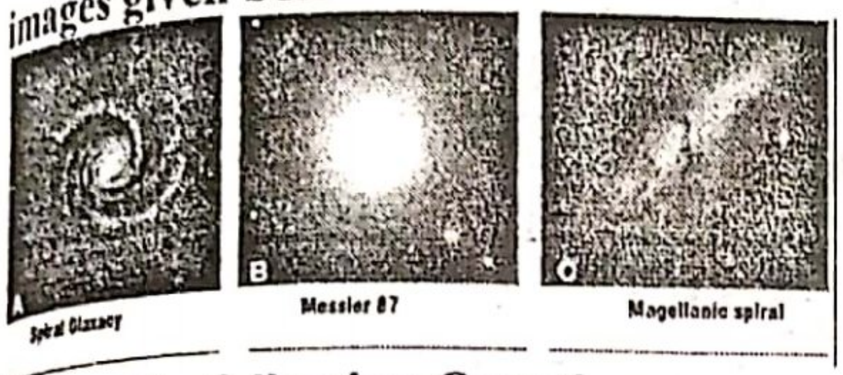
Ans. Stars are born (forming out of matter), where gaseous clouds contract due to the pull of gravity.

If the star is large amount, it can go through a sense of less, efficient nuclear reactions to produces internal heat. However, eventually these reactions will no longer generate sufficient heat to support the star again its own gravity and the star will collapse. Some stars

ends up as white dwarf, and others as neutron Star or black hole, its life depends on the mass it was born with stars that have a lot of mass may end their lives as black hole or neutron stars. A low or medium mass stars (with mass less than about 8 times the mass of our sun) will become white dwarf.

D. Structured questions

Q1. Identify the type of each galaxy from the images given below.



Answer the following Questions

i. Which type of galaxy is the largest as well as the smallest?

Ans. Largest Galaxy is Giant Ellipticals
And the smallest Galaxy is irregular Galaxies

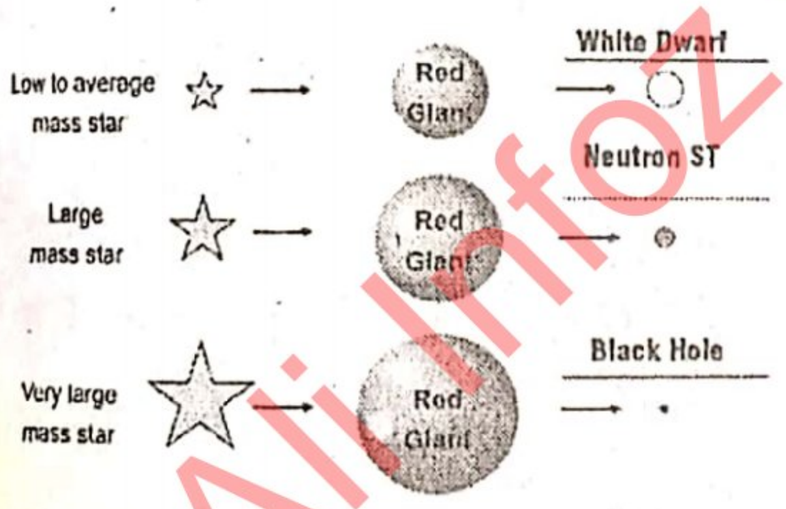
ii. Which Galaxy has no 'galactic bulge'?

Ans. Irregular Galaxies has no galactic bulge.

iii. Milky way galaxy falls close to which category of galaxies?

Ans. Milky Way galaxy falls to spiral galaxies.

2. Consider the diagrammatic representation of fate of dying star depending upon its mass and label the end results.



Additional Questions

Q1. What do you know about space probes?

Ans: A space probe is a robotic spacecraft that travels through space to collect scientific information

Importance:

- It doesn't orbit the earth
- Probes don't have astronauts
- Probes send data back to earth for scientist to study.
- Many space probes have bee sent in space, which are sending information about heavily objects and other artificial satellites.

Example:

Voyages –1 and Voyages – 2 were probes used for collecting data about Mars and Jupiter.

Q2. Define cosmology?

Ans. Cosmology in the study of the characters and evolution of the universe.

Q3. Define stars?

Ans. Stars are huge balls of hot gases that emit light and other radiation.