

GENERAL SCIENCE

Unit 1

HUMAN ORGANS SYSTEM

EXERCISE

Fill in the blanks.

- (A) Human brain is divided into _____ parts.
- (i) Reflex actions occur with the help of _____.
- (ii) The actions which are performed under conscious control are called _____.
- (iii) Filtering of blood takes place in the _____.
- (iv) _____.
- (v) Cleaning of blood by artificial methods is called _____.

Ans. (1) 3 (ii) receptor, sensory neuron, and effectors. (iii) voluntary actions (iv) kidney (v) dialysis

(B) Choose the correct answer for each of the following statements.

(i) Sensory neurons carry messages towards:

- (a) muscles
- (b) muscles and glands
- (c) sense organs
- (d) brain and spinal cord

(ii) The part of neuron which receives messages are:

- (a) cell bodies
- (b) dendrites ✓
- (c) axons
- (d) nuclei

(iii) Accumulation of salts in kidneys results in:

- (a) diabetes
- (b) hypertension
- (c) kidney stone ✓
- (d) cancer

(iv) Medium sized stones are removed by:

- (a) dialysis
- (b) lithotripsy ✓
- (c) excretion
- (d) laser

(v) Renal failure can be caused by:

- (a) infections
- (b) hypertension
- (c) diabetes mellitus
- (d) all of these ✓

SHORT ANSWERS

(C) Give short answers of the following:

(i) Define:

(a) excretion (b) reflex action (c) neuron

Ans.

(a) **Excretion:** Elimination of waste material from body is called excretion.

(b) **Reflex action:** An immediate and involuntary response to a stimulus is called reflex action.

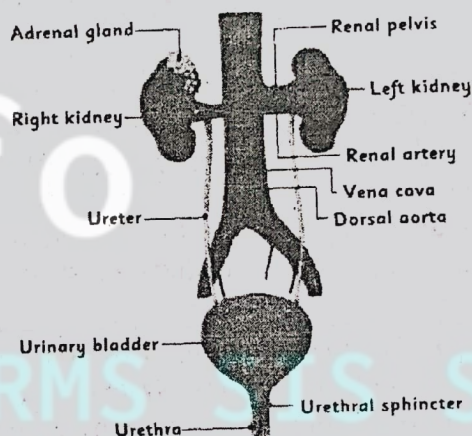
(c) **Neuron:** Brain has more than 100 billion nerve cells, which are called neurons.

(ii) **Skin is also considered as excretory organ, why?**

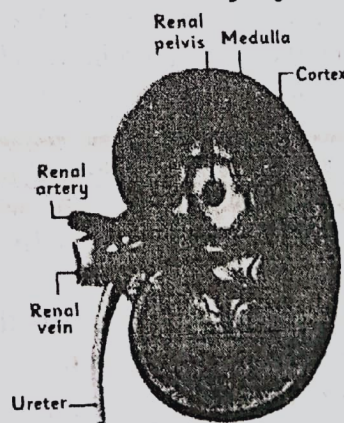
Ans. Skin is considered an excretory organ because sweat gland is present to the skin which secrete a waste fluid called sweat perspiration

(iii) **Draw and label the structure of a neuron.**

Ans.



Human excretory system



Internal structure of kidney

(iv) Differentiate between:

Ans. Differentiate between

(a) Receptors and effectors.

(a)

Receptors	Effectors
A receptor detects the	An effectors converts

stimuli and convert it into an impulse. Example: A light receptor in the eye detects danger in light in the environment.	the impulse into an action. Example: Muscle.
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(b) Voluntary and involuntary actions with examples.

Voluntary action	Involuntary action
Those actions which are according to our will and involves thinking are called voluntary action. Example: Reading a book, running etc.	Those actions which are not according to our will and do not involve our thinking. Example: Digestion, actions, salivations movement of food along alimentary canal, heart beats, slink of eyes etc.

(c) Lithotripsy and dialysis.

Lithotripsy	Dialysis
Lithotripsy is the breaking up of kidney stones by means of ultrasound.	Cleaning of blood by artificial method is called dialysis.

(v) Explain the central neurons systems.

Ans. The central nervous system acts as a control center of the whole nervous system. It comprises brain and spinal cord. The brain can be divided into three main parts (a) fore brain (b) Mid brain (c) Hind brain.

DETAILED ANSWERS

(D) Give detailed answers to the following questions.

(i) Explain reflex action with the help of an example and diagram.

Ans. **The Reflex Action**

An immediate and involuntary response to a stimulus is called reflex action. These are the sudden automatic responses of the body which are shown for certain stimuli without the will of the person. Quick pulling of hand just after touching the hot object is a stimulus, which is received by the cells (receptors) of the skin. A nerve impulse is created in the sensory neuron

present in skin. The nerve impulse is carried by the sensory neuron to the spinal cord. The inter neuron of the spinal cord processes the impulse within no time and transmits the impulse to the motor neuron. The motor neuron carries the impulse to the arm muscles (electors). The arm muscles contract and the hand is pulled back. The pathway of nerve impulses, which complete a reflex action, is called a reflex arc. It consist of receptor, a sensory neuron, an inter neuron, a motor neuron and effectors.

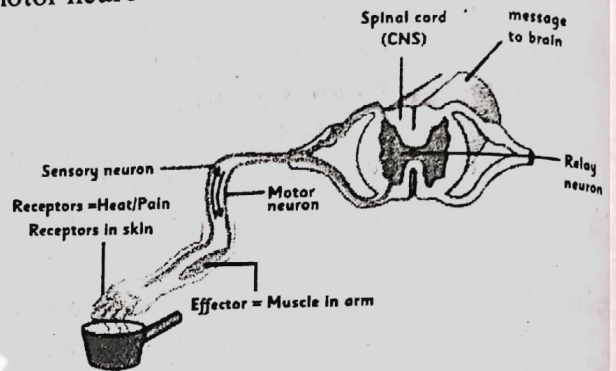
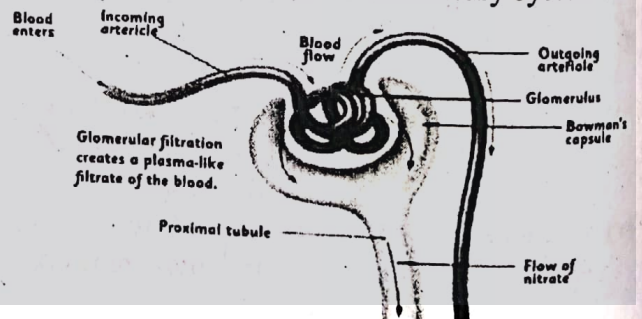


Fig.

(ii) Describe the role of kidneys in excretion of waste.

Ans. **Role of Kidney**

Blood carrying nitrogenous waste materials from the body is brought to the kidneys by incoming blood vessels called arterioles. Inside the kidneys, blood containing nitrogenous waste reaches the Glomerules. Here most of the excess water and waste materials filtered from the blood into the Bowman's capsule. The blood after losing waste material goes into the outgoing arteriole, which ultimately with many other arterioles forms the renal artery. The clean blood is brought back to the main circulatory system.



Structure of Bowman's capsule

The waste material and excess water pass into the renal tubule from the Bowman's capsule. From here, the waste material and excess water passes through the proximal tubule, the loop of

Henle and finally through the distal tubule into the collecting duct in the form of urine. The urine then drains from the collecting tubules into the renal pelvis, which opens into the ureter from each kidney. From the ureter, the urine is passed to the urinary bladder. From here the urine is passed out of the body through the urethra.

(iii) A person with kidney disease could be treated either by using a dialysis machine or by a kidney transplant operation. Compare the advantages and disadvantages of these two methods of treatment and how long does a transplanted kidney last.

OR

What are the advantages and disadvantages of a kidney transplant over dialysis?

Ans. Advantages and disadvantages of dialysis

Advantage	Disadvantages
<ul style="list-style-type: none"> Dialysis can be carried out at home Works well for someone waiting for an organ Really available No immuno suppressant drugs need to be taken No risk due to operation 	<ul style="list-style-type: none"> Expensive as treatment repeated for long time May cause blood clots/not clot properly High risk of infection Requires a restricted diet and life style Requires long amount of time connected to dialysis machine

Advantages and disadvantages of kidney transplant

Advantages	Disadvantages
<ul style="list-style-type: none"> It eliminates the need for dialysis and helps patients to enjoy a life filled with more freedom Successful kidney transplantation treats peoples kidney failure and gives you back your health Usually you will have less restriction on fluids intake and diet 	<ul style="list-style-type: none"> Risks associated with major surgery Risks of rejection your transplant may not last a life time Daily medications required which can cause side effect Some of drays cause unwanted side effect such as weight gain, acne or excess hair growth

after receiving a transplant • May patients also return to work and lead a full life after transplant	• Susceptibility to infection
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Evaluation:

“Longer life with a transplant”. On the other hand, patients who receive a kidney transplant typically live longer than those who stay on dialysis. A living donor kidney functions on average, 12 to 20 years, and a deceased donor kidney from 8 to 12 years.

Unit 2

HEREDITY IN ORGANISMS

EXERCISE

- (A) Choose the correct answer for each of the following
- (i) Living organisms have a set of characteristics that are transferred from:
- (a) environment (b) school
 - (c) parents (d) all of the these
- (ii) Conversion of a cell into two daughter cells is called:
- (a) growth (b) cell division
 - (c) cell inheritance (d) cell death
- (iii) Chromosomes are made up of:
- (a) DNA (b) proteins
 - (c) DNA and Protein (d) fats
- (iv) Transfer of traits from parents to offsprings is called:
- (a) heredity (b) reproduction
 - (c) transformation (d) division
- (v) Eye colour in human beings is controlled by:
- (a) genes (b) nucleus
 - (c) cytoplasm (d) meiosis
- (B) Match the words of column A with suitable words of column B.

Column A	Column B
DNA	Two identical daughter cells
Free earlobe	23 pairs

Mitosis	Gene
Chromosome in humans	Thymine
Adenine	Heritable character

Ans.

Column A	Column B
DNA	Gene
Free earlobe	Heritable character
Mitosis	Two identical daughter cells
Chromosome in humans	23 pairs
Adenine	Thymine

SHORT ANSWERS

(A) Give short answers of the following.

(i) Define the following terms.

(a) Gene (b) DNA (c) Chromosome

Ans.

(a) **Gene:** A gene is the basic physical and structural unit of heredity.

(b) **DNA:** Deoxyribonucleic acid or DNA is a molecule that contains the instruction an organism needs to develop, live and reproduce.

(c) **Chromosome:** A thread-like structure of nucleic acids and protein found in the nucleus of most living cells carrying genetic information in the form of genes.

(ii) **Where does meiosis take place in the human body? How many cells are produced from parent cell, when it divides by meiosis?**

Ans: Meiosis takes place in the germ cells of an organism when parent cell divides by meiosis (they) it produces four daughter cells.

(iii) **Write any four inheritable characters and three non-inheritable characters.**

Ans: **Inheritable characters:**

- | | |
|----------------|--------------------|
| 1. hair colour | 2. eye colour |
| 3. skin colour | 4. facial features |
| 5. height | 6. dimples |

Non-inheritable characters

- 1: playing
- 2: table manner
- 3: greeting customs
- 4: dancing ⇒ (These are the non-inheritable characters because these characters are

not in genes and thus not transferred from parents to offspring)

(iv)

How does the amount of pigment affect the eye colour in human beings?

Ans.

If genes produce more pigment, the eyes are black. If genes produce very less pigment then eyes color will be light brown. Blue green and hazel eye colors are produced due to the production of brown pigment in different amounts.

(v) **Explain heredity.**

Ans.

The transfer of characteristics from parents to offspring is called heredity.

DETAILED ANSWERS

(D) Give detailed answers to the following questions:

(i) **Explain the need for the production of genetically identical cells.**

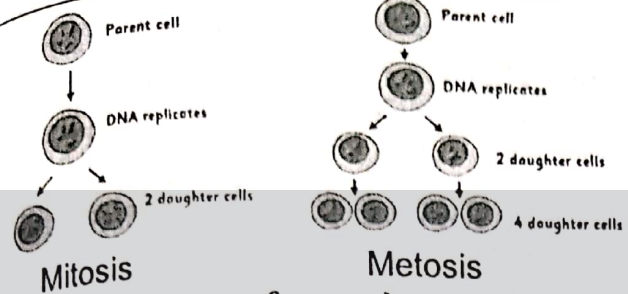
Ans. Genetically identical cells are produced by (the) a type of cell division called mitosis. The function of this type of cell division is to produce new cells for the growth and repair of body tissues. It is essential that the cells are identical so that they have exact copies of genetic code as the 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.

(ii) **Write down the differences between mitosis and meiosis with the help of diagrams.**

Ans.

Mitosis	Meiosis
1. Mitosis occurs in all somatic/body cells of an organism	1. Meiosis occurs in the germ cells of an organism.
2. Two daughter cells are formed	2. Four daughter cells are formed.
3. Daughter cells have a complete set of chromosomes identical to the parent cell	3. Daughter cells have half the number of chromosomes as compared to the parent cell.
4. The daughter cells are genetically identical	4. The daughter cells are genetically different.

5. Involves in single division. 5. Involve double cell division.



(iii) Give any four characteristics of humans which are affected by the heredity.

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

Characteristic of humans affected by heredity:

1. Eye colour
2. Height
3. Attached and detached earlobes

Unit 3

BIOTECHNOLOGY

EXERCISE

- (A) Choose the correct answer for each of the following statements.
- (i) The additional circular pieces of DNA present in bacterial cell are called:
 (a) RNA (b) chromatid
 ✓ (c) plasmid (d) nucleotide
- (ii) The branch of science in which living organisms are used for the welfare of humans is called:
 (a) biochemistry
 ✓ (b) biotechnology
 (c) microbiology (d) genetics
- (iii) Plasmid and attached foreign gene with it are collectively called:
 (a) recombinant cell
 ✓ (b) recombinant DNA
 (c) recombinant plasmid
 (d) recombinant chromosome
- (iv) The organism whose genes are modified is called:
 ✓ (a) GM organism
 (b) transgenic organism
 (c) recombination organism

- (d) all of these
- (v) A gene is inserted into a bacteria by:
 (a) digestion
 ✓ (b) genetic engineering
 (c) fermentation
 (d) biodegradation

(B) Match the words of column A with suitable words of column B.

Column A	Column B
Plasmid	DNA
Diabetes	Stimulating growth
Growth hormone	Insulin
Double helix	Vector
GMOs	modified genes

Ans.

(B) Match the words of column A with suitable words of column B.

Column A	Column B
Plasmid	Vector
Diabetes	Insulin
Growth hormone	Stimulating growth
Double helix	DNA
GMOs	modified genes

SHORT ANSWERS

- (C) Give short answers of the following.
- (i) Define biotechnology.
 Ans. The use of living organisms for the welfare of mankind is called biotechnology.
- (ii) Write some important products of biotechnology.
 Ans: • Bio-diesel • washing detergent
 • sugars • plastics
 • different medicine e.g. insuline for diabetes, vaccines and antibiotics
 • Bakery products, yogurt cheese, bread, vinegar
- (iii) What are genetically modified organisms?
 Ans: The organisms whose genes are modified are called genetically modified organisms or transgenic organisms.
- (iv) What is DNA replication? Explain.
 Ans: DNA replication is the biological process of producing two identical replies of DNA from one orginal DNA molecule. This

process occurs in all living organism and is the basis for biological inheritance.

- (v) Draw a labeled diagram of bacterium.
 Ans: See text book page no '30' Fig 3.3 bacterium (labeled diagram)

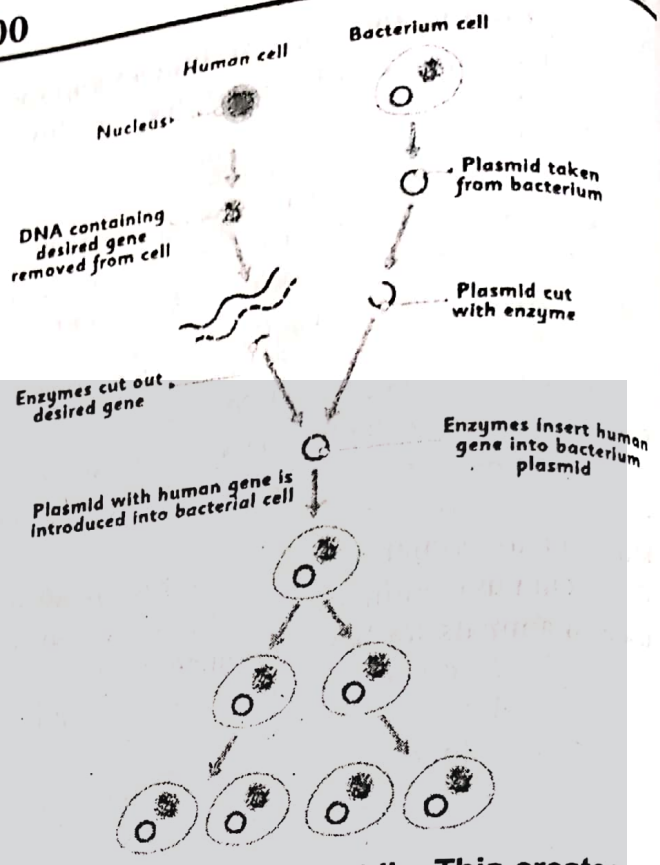
DETAILED ANSWERS

(D) Give detailed answers to the following questions:

(i) Explain the process of introducing gene into bacteria.

Ans. Process of introducing gene into bacterium

1. The first step is the identification and isolation of gene from donor organism.
2. An enzyme called restriction enzyme is used to cut the gene from the DNA of donor organism.
3. The isolated gene is then attached with plasmid DNA taken from a bacterium. The attached gene and plasmid DNA are collectively called recombinant DNA.
4. The recombinant DNA is then introduced into a bacterium, the bacterium starts dividing and produces a bacterial colony. Thus every bacterium of the colony contains the desired gene and hence they produce the desired product (protein).



Bacteria reproduce rapidly. This creates bacteria with the new characteristic

(ii) Describe the role of biotechnology in agriculture and health.

Ans. **Role of Biotechnology in agriculture**

Biotechnology has played an important role in improving our agricultural yield. Herbicides (weed killing chemicals) and pesticides (insect killing chemicals) are used to eliminate weeds and insects and thus protects crops. Biotechnology improves the taste, texture and appearance of the food. The major crops that have been modified by biotechnology are maize, wheat, rice potato, corn and soybean.

Role of biotechnology in Health

Biotechnology techniques are also used for curing disease and improving health. Identification of causes of diseases, production of medicines and correction of genetic defects etc. are the major contributions of biotechnology. Various biotechnology products that are used to save lives included.

- Insulin useful for diabetics
- Vaccines Used against many infectious disease
- Growth hormones Useful for stimulating growth

(iii) Describe the role of biotechnology in meeting the nutritional needs of human beings.

Ans. Biotechnology plays a vital role in meeting the nutritional needs of human population. We can enhance food production and nutrition by improvements in livestock and plants using different techniques of biotechnology such as tissue culture and plants using different techniques of biotechnology such as tissue culture and genetic engineering etc. Tissue culture is an important technique of biotechnology. We can get the types of crops and other plants, which give more production using this technique. Similarly, genetic engineering is used in animals for better production of milk and meat. For example, Neeli Ravi buffalo is produced for better production of milk and Nancy sheep for production of more meats.

Unit 4

POLLUTANTS AND THEIR EFFECTS ON THE ENVIRONMENT

EXERCISE

- (A) Fill in the blanks.
- (i) Dry air contains almost _____ percent of nitrogen.
 - (ii) Ozone layer filters _____ from sunlight.
 - (iii) Rain can carry oxides of nitrogen to rivers and soil, which can lead to abnormal growth of algae, this is _____.
 - (iv) _____ is a poisonous gas, produced by the incomplete combustion of coal and other fossil fuels.
 - (v) The word 'Ozone' is a Greek word meaning _____.
- Ans. (i) 78% (ii) shorter wavelength and highly hazardous ultraviolet radiation (iii) eutrophication (iv) CO (carbon monoxide) (v) strong odour
- (B) Choose the correct answer for each of the following statements.
- (i) Which of the following is not a greenhouse gas?
 - (a) methane
 - (b) carbon dioxide

- ✓ (c) sulphur dioxide
- (d) nitrogen
- (ii) The main reason for increase in the amount of carbon dioxide in air is:
 - ✓ (a) plantation
 - (b) deforestation
 - (c) recycling (d) using CFC's
- (iii) The phenomenon which does not lead to global warming:
 - (a) green house effects
 - (b) Ozone depletion
 - (c) CFC's
 - ✓ (d) photosynthesis
- (iv) Ultraviolet radiations from sun that reach the earth cause:
 - (a) Respiratory disorder
 - (b) Typhoid fever
 - ✓ (c) Skin cancer (d) Bronchitis
- (v) The source of all of the following pollutants is vehicle exhaust EXCEPT
 - (d) Carbon mono-oxide
 - (b) Carbon dioxide
 - ✓ (c) CFC's
 - (d) Nitrogen oxides

SHORT ANSWERS

- (C) Give short answers of the following:
- (i) What are the main air pollutants?
 Ans: Carbon monoxide (CO), sulphur dioxide (SO₂) oxide of nitrogen (NO and NO₂), chlorofluoro carbons (CFCs) etc are the main air pollutants.
 - (ii) Name two greenhouse gases. Why are they called 'greenhouse' gases? Briefly explain.
 Ans: 1. Carbon dioxide 2. oxide of nitrogen, These gases trap a part of the heat reflected by the earth causing an increase in the atmospheric temperature. This atmospheric effects is known as green house effect. The gases involved in the green house effect are called green house gases.
 - (iii) How can we conserve our resources?
 Ans. The protection and preservation of natural resources in the environment is called conservation, resources can be conserved Indirectly through human population control and reducing pollution.

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- Directly through conserving natural resources

(iv) What are the sources of chlorofluorocarbons?

Ans: Chlorofluoro carbons have no natural sources but were entirely synthesized for such diverse uses as refrigerants aerosol pro-plants and cleaning solvents.

(v) Define deforestation and its effects.

Ans. Deforestation is the permanent destruction of forests in order to make the land available for other uses. The most dramatic impact is a loss of habitat for million of species. Deforestation causes

- air pollution
- soil erosion
- less rain
- green house effect
- destroy wild life

DETAILED ANSWERS

(D) Give detailed answers to the following questions.

(i) Which human activities can cause air pollution? What are the negative effects of air pollution?

Ans: Human activities that cause air pollution

1. **Vehicle emission:** Vehicle emission is source of fossile fuel emission and air pollution.

2. **Industry:** Industrial process release pollutant such as nitrous oxide and hydrofluro carbons into the air and cause air pollution.

3. **Wood Fire:** Wood fire cause air pollution by releasing particulate matter into the air and cause air pollution.

Negative impact of air pollution

1. **Acid rain:** Chemical reactions involving air pollutants can create acidic rain compounds which can cause damage to vegetation and buildings.

2. **Eutrophication:** Rain can carry oxides of nitrogen to rivers and soil. This can cause abnormal growth of algae in water bodies making conditions for other aquatic organism very difficult to live.

3. **Grand level ozone:** Chemical reactions involving air pollutants create poisonous ozone (O_3) gas, which affect people's health and can damage plants and animal life.

(ii) Why it is important to conserve the environment? Give two reasons.

Ans: It is important to conserve the environment due to the following reasons.

1. **A clean environment is essential for healthy living**

When the earth is sick and polluted human health is impossible to heal ourselves we must heal our planet and to had our planet we must heal ourselves.

2. **Biodiversity is important:**
Biodiversity refers to the variety of plants, animals and other living things in our world. It can be negatively activity, climate change and pollution and among other things. Loss of biodiversity could cause other problems. The greater the diversity of life, the greater the opportunity for various discoveries that could make our world a much better place.

(iii) Define Global warming. What are the causes and effects of global warming?

Ans: **Global warming:**

Global warming refers to the rise in average temperature on earth.

Cause of global warming:

Due to human activities like burning of fuels, industries, vehicles etc, the green house gases are continually increasing in the atmosphere and speeding up the green house effect. As a result, the earth is getting warmer and warmer this phenomenon is known as global warming.

Effects of global warming:

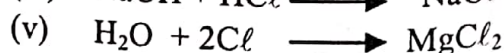
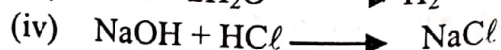
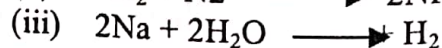
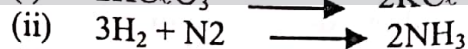
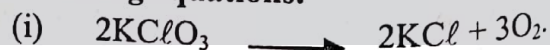
Global is causing the glaciers to melt at an alarming rate. The snow on polar regions and the mountains melts faster, causing floods and raise in the level of se water.

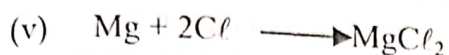
Unit 5

CHEMICAL REACTIONS

EXERCISE

(A) Fill in the blanks to complete the following equations.





Ans: (i) 2KCl (ii) N_2 (iii) 2NaOH
(iv) NaCl (v) 2Cl

(B) Choose the correct answer for each of the following statements:

(i) Substances on the left hand side of a chemical equation are called:

- (a) electrons (b) groups
(c) products (d) reactants ✓

(ii) The reaction in which there is only one reactants, which must be a compound is:

- ✓ (a) decomposition (b) displacement
(c) synthesis
(d) double displacement

(iii) Number of atoms of reactants is equal to number of products in a balanced chemical equation:

- (a) sometimes (b) often
✓ (c) always (d) never

(iv) The reaction between sodium and chlorine to form sodium chloride is:

- ✓ (a) displacement
(b) decomposition reaction
(c) addition reaction
(d) double decomposition reaction

(v) The heat evolved or absorbed during a chemical reaction is called:

- ✓ (a) heat of reaction (b) exothermic
(c) heat energy (d) endothermic

SHORT ANSWERS

(C) Give short answers of the following.

(i) What are the characteristics of chemical reactions?

Ans:

- (1) Evolution of a gas
- (2) change in colour
- (3) formation of a precipitate
- (4) change in state
- (5) change in temperature

(ii) Define chemical reaction and its types.

Ans: Chemical reaction

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

Types:

1. addition or synthesis reaction
2. decomposition reaction

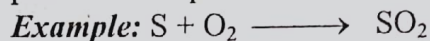
3. single displacement reaction or substitution reaction

4. double displacement reaction

(iii) Explain each type of chemical reaction with one example each.

Ans: (1) Addition reaction:

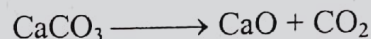
These chemical reactions occur where two or more substance react together to form one product example:



2. Decomposition reaction:

Decomposition reaction have one reactant which breaks up to form two or more products.

Example:



Calcium carbonate calcium oxide carbon dioxide

3. Single displacement reaction:

When a more reactive element displaces a less reactive one from its compound is called single displacement reaction.

Example:



Zinc + hydrochloric acid hydrogen + zinc chloride

4. Double displacement reaction:

Double displacement reaction involve the exchange of ions between two compounds.

Example:



Hydrochloric acid sodium hydroxide sodium chloride + water

(iv) Exothermic reactions are very important in our daily life. Give two reasons.

Ans: Reasons for importance of exothermic reactions:

1. The life on earth is possible due to the exothermic reactions taking place in the sun
2. The heat released during respiration, not only keeps us warm but also provides energy for our normal functions.

(v) What is a balanced chemical equation? Why chemical equations need to be balanced?

Ans: Balanced chemical equation:

A balanced chemical equation occurs when the number of different atoms of elements

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in the reactants side is equal to that of products side.

A chemical equation needs to be balanced so that it follows law of conservation of mass. Balancing chemical equation is a process of trial and error.

DETAILED ANSWERS

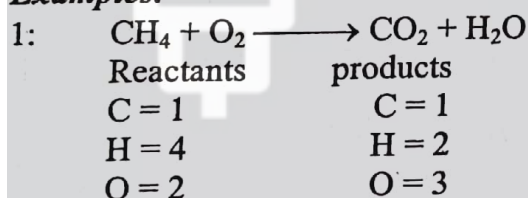
(D) Give detailed answers to the following questions.

(i) Explain the steps for balancing of chemical equations with two examples.

Ans: Steps for balancing chemical equation:

1. Write unbalanced chemical equation. The symbol and formulae of the reactants and product must be correct.
2. Count the number of atoms of each element on both sides.
3. If the number of atoms are different on both sides, write the required number as coefficients of symbols and formulae.
4. Work with one element at a time.
5. Always start with a relatively small number.
6. Start with atoms that appear only once in the reactants and products usually leave the diatomic elements like nitrogen hydrogen and oxygen etc. Until last.

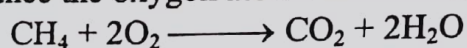
Examples:



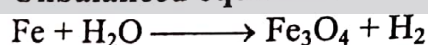
We have 4 H in CH_4 at left side and only 2+1 in water on right side, so we need to double the coefficient of H_2O to balance hydrogen atom on both sides.



Added 2 as co-efficient of O_2 at left side to balance the oxygen atoms on both sides.



2. Unbalanced equation:



Balance equation:



(ii) (a) Define Law of conservation of mass. Explain with the help of two examples.

Ans: Law of conservation of mass:

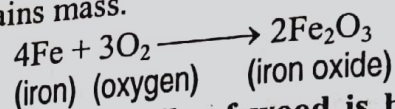
This law was put forward by a French chemist Lavoisier in 1785.

"Mass can neither be created nor destroyed during a chemical reaction."

During a chemical reaction total mass of product is equal to the total mass of reactants.

Examples:

1. When a piece of iron is left in moist air its surface gradually turns brown the iron gets rusted and gains mass.



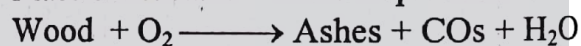
(b) When a pile of wood is burnt, the ash left behind is less as compared to wood. How Law of conservation of mass is applicable in this situation?

Ans. When wood burns it leaves behind ash. The ash is lighter than coal. But the mass of coal will be equal to that of ash and the liberated carbon dioxide.

(a) According to law of conservation of mass "Mass can neither be created nor destroyed however, it can change from one form to another form during a chemical reaction."

When a pile of wood is burnt the ash left behind is less as compared to wood but the mass of wood will be equal to that of ash and the liberated carbon dioxide hence,

Mass of reactant = Mass of product



(iii) Define heat of reaction. Differentiate between exothermic and endothermic chemical reactions, with two examples.

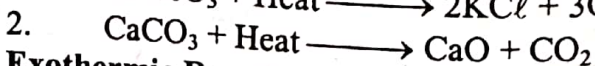
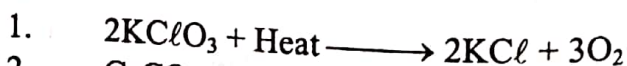
Ans. Heat of Reaction:

The heat evolved or absorbed during a chemical reaction is called heat of reaction.

Endothermic Reactions:

"Endo" means inside and "therm" mean heat, so the endothermic refers to those reactions in which heat is absorbed from the surroundings.

For example, the decomposition of potassium chlorate and calcium carbonate require heat.



Exothermic Reaction:

“Exo” mean outside and “therm” mean heat so the exothermic reactions are those reactions in which heat is released into the surroundings:

For example,

1. Burning of natural gas

$$\text{CH}_4 + 2\text{O}_3 \longrightarrow \text{CO}_2 + 2\text{H}_2\text{O} + \text{Heat}$$
2. formation of ammonia

$$3\text{H}_3 + \text{N}_2 \rightleftharpoons 2\text{NH}_3 + \text{Heat}$$

Unit 6

ACIDS, ALKALIS AND SALTS

EXERCISE

- (A) Complete the following statement.
- (i) All alkalies are bases but all the bases are not _____
 - (ii) An acid and base react to form salt and water and this reaction is called _____
 - (iii) Acid give salt and _____ when treated with metal.
 - (iv) NaOH reacts with MCI producing NaCl and _____.
 - (v) Vinegar contains _____ acid.
- Ans. 1. alkalies, 2. neutralization reaction
 3. hydrogen gas 4. H₂O 5. acetic
- (B) Choose the correct answer each of the following statements,
- (i) Which one of the following acids is used in car batteries?
 - (a) HCl
 - (b) HNO₃
 - ✓ (c) H₂SO₄
 - (d) None of these
 - (ii) The colour of red and blue litmus stays same in aqueous solutions of:
 - (a) HCl
 - (b) HNO₃
 - (c) H₂SO₄
 - (d) NaCl ✓
 - (iii) The alkali used as an antacid is:
 - (a) KOH
 - (b) Ca(OH)₂
 - (c) NaOH
 - (d) Al(OH)₃ ✓
 - (iv) Which one of the following salts is used in the treatment of constipation?
 - (a) NaCl
 - (b) MgSO₄ ✓
 - (c) CuSO₄
 - (d) NaHCO₃
 - (v) Rose petals turn blue in:
 - ✓ (a) alkaline solution
 - (b) acidic solution
 - (c) salty solution
 - (d) neutral solution

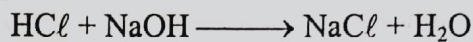
SHORT ANSWERS

- (C) Give short answers of the following.
- (i) Define neutralization reaction and give examples.

Ans. Neutralization Reaction

When acids treated with an alkali they give salt and water. This reaction is called neutralization reaction.

Example:



- (ii) Why CH₃COOH is an acid?

Ans. Chemically if a compound gives proton on dissociation it is an acid. Acetic acid has (-COOH) carboxylic group which partially dissociates in aqueous solution and this group is responsible for acidic nature of acetic acid.

- (iii) How will you proceed to distinguish between acid, alkali and salt?

Ans. Acids	Alkalies	Salts
• They are liquid	• They feel soapy in touch	• The aqueous solution of salt conduct electric current
• Acid taste sair	• They taste bitter	• Salt may be acidic, basic or neutral
• Acids contain H ⁺ ions	• Alkalies contain OH ⁻ ions	• Salt may be acidic
• Acids burn universal indicator from green to red.	• Alkali turn universal indicator from green to blue or purple	• The general formula of salt is written as BnAm

- (iv) Define acid, alkali and salt. Give two examples of each.

Ans. An acid is a substance, which provide hydrogen ions H⁺ in aqueous solution.

Example:

1. Acetic acid (Vinegar)
2. Citric acid (Lemon)

Alkali: An alkali is a base that dissolve in water.

Example:

1. Potassium hydroxide
2. Sodium hydroxide

Salt:

A salt is a compound that can be formed by the neutralization reaction of an acid and a base.

Example:



- (v) Plaque is formed on your teeth. Plaque feeds on the sugar left on your teeth if you do not brush your teeth and produces acid. Why is it good to use bicarbonate toothpaste and brush the teeth twice a day?

Ans. Brushing teeth with bicarbonate (baking soda) tooth paste aids in dislodging plaque built up on the teeth aside from giving you a brighter smile.

DETAILED ANSWERS

- (D) Give detailed answers to the following questions.

- (i) Describe the physical and chemical properties of acids and alkalies, Give their uses as well.

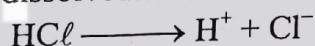
Ans. **Physical Properties Acids**

Acids have following physical properties:

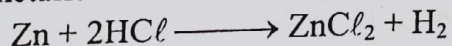
1. Sour taste.
2. Turn blue litmus paper to red.
3. Turn methyl orange to red.
4. Aqueous solution of acids conduct electric current.
5. Strong acids destroy fabric and cause burns on the skin.

• **Chemical Properties of Acids:**

1. **Ionization:** Acids give hydrogen ion when dissolved in water.



2. **Reaction with metal:** Acids produce salt and hydrogen gas when treated with metals.



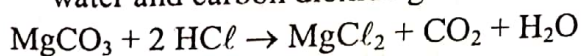
3. **Reaction with alkalis:**

They give salt and water when treated with alkali.



4. **Reaction with carbonates:**

Acid and carbonates react to produce salt, water and carbon dioxide gas.



• **Uses of acids:**

1. Vinegar contain acetic acid. It is used in pickles and in many food preparation.
2. Sulphuric acid is used in car batteries.

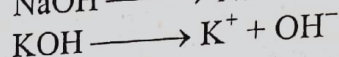
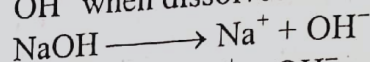
3. Citric acid is used in preparation of fruit salt.

• **Physical properties of alkalis**

1. They have bitter taste.
2. They are slippery in touch.
3. They conduct electricity when dissolved in water.
4. They turn red litmus to blue.
5. Strong alkalies damage skin and fabrics.

• **Chemical properties of alkalies**

Ionization: Alkalies give hydroxy/ions OH^- when dissolved in water



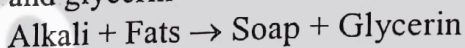
2. **Reaction with acid**

They give salt and water when treated with acids.



3. **Reaction with fats:**

Alkalies reacts with fats to produce soap and glycerin



• **Uses of alkalies:**

1. Ammonia is used in the production of fertilizers and in the manufacturing of nitric acid.
2. Aluminium hydroxide is used as antacid to reduce the acidity of stomach.
3. Calcium hydroxide is used for white wash.
4. Sodium hydroxide is used in the manufacturing of soap and detergents.

- (ii) **What is a salt? What are the uses of salt? Give three examples of salts.**

Ans. **Salt**

A chemical compound formed by the reaction of an acid and base is called salt.

Use of salts:

1. Sodium chloride is used as table salt, preservative and in industries for the manufacture of many sodium compounds.
2. Potash alien is commonly used in water purification, and as antiseptic for minor bleeding due to shaving.
3. Copper sulphate is very versatile chemical and is extensively used in industry in agriculture it is used as pesticide.
4. Sodium carbonate is used as water softener, glass making, soap manufacturing, washing soda paper

- industry, petroleum refinery and as a household cleaning agent.
5. Baking soda is commonly used as an acid, in fire extinguishers.
6. Magnesium sulphate is used as a laxative in medicine to treat constipation.

Examples of salts

1. Table salt (NaCl)
2. Calcium sulphate (CaSO₄)
3. Potassium chloride (KCl)

(iii) Solution (1), which has a pH of 4 is added to solution (2), until the mixture has pH of 7.

- (a) What can you say about solution (1)?
- (b) What can you say about solution (2)?
- (c) What can you say about the mixture of 1 and 2?

Ans.

- (a) Solution 1 has pH of 4 which means that solution 1 is acidic solution.
- (b) Solution 2 is of water.
- (c) When we dilute an acidic solution by adding water, the concentration of H⁺ ions will decrease. This effect will cause the pH to increase towards 7. The mixture of solution 1 and 2 has pH of 7 that means it is not acidic nor alkaline but actually it is neutral solution.



Unit 7

FORCE AND PRESSURE

EXERCISE

- (A) Complete the following statement.
- (i) The study of the behavior of gases under pressure is called _____
 - (ii) The transmission of _____ through a liquid takes place in the hydraulic press.
 - (iii) The pressure at any point in a liquid depends upon _____
 - (iv) The SI unit of area is _____
 - (v) A thick layer of air around our earth is called _____

- Ans.
- (i) pneumatics (ii) force
 - (iii) depth of the point
 - (iv) m² (v) atmosphere

(B) Choose the correct answer for each of the following statements:

(i) The formula of pressure, P =

- (a) $F \times A$ (b) A/F
- (c) F/A (d) $F \times D$

(ii) Which of the following is not a rare gas?

- (a) Krypton (b) Xenon
- (c) Ozone (d) Radon

(iii) A syringe gets filled due to:

- (a) air pressure
- (b) water pressure
- (c) vapour pressure
- (d) none of these

(iv) Atmospheric pressure at Peshawar is _____ than Murree:

- (a) greater
- (b) sometimes equal
- (c) always equal (d) less

(v) Experiments show that pressure of a gas depends upon:

- (a) quantity and temperature
- (b) atmospheric pressure
- (c) quantity (d) temperature

SHORT ANSWERS

(C) Give short answers of the following.

(i) Explain the relationship between force, area and pressure.

Ans. Pressure is defined as force per unit area:

$$P = \frac{F}{A}$$

So, obviously force and pressure are related i.e., force is directly proportional to pressure which means the more force you apply upon a fixed area the more pressure you create.

(ii) Write a note on Pascal's principle with examples.

Ans. Pascal's principle:

"Pressure applied at any point of a liquid enclosed in a container is transmitted without loss to all other parts of the liquid."

Example: Brakes of vehicles work on the Pascal's principle.

(iii) Define pneumatics. How it is related to the force of attraction between gas molecules?

Ans. Pneumatics "The study of behaviour of gases under pressure is called *pneumatics*."

The molecule of a gas are free to move because the forces of attraction between them are very weak. When we fill a container with a gas, the gas molecules collide with one another as well as with the walls of the container. Thus they exert pressure on the walls of the container.

(iv) **What are aerosols? Write down the applications of gas pressure.**

Ans. Aerosols

Aerosols is a suspension of big liquid particles dispersed to a gas present in a closed container.

Application of gas pressure:

1. Air motion is caused due to difference in air pressure.
2. Syringe is fitted due to gas pressure.
3. Insecticides and pesticides are sprayed through spray machine because of gas pressure.

(v) **Relate the height from the Earth's surface with the atmospheric pressure.**

Ans. Atmospheric pressure acts in all directions. It decreases with increase in height from the earth's surface.

DETAILED ANSWERS

(D) **Give detailed answers to the following questions.**

1. (a) **What is pressure? State its SI unit.**

Ans. Pressure

The amount of force acting perpendicular on unit area of a body is called pressure

$$\text{Pressure} = \frac{\text{Force}}{\text{Surface area}}$$

SI Unit of pressure:

In system international units the unit of pressure is called Pascal denoted by Pa, the unit of force of Newton (N) and that of area is square meter (m^2) so by putting these values in above equation we get

$$\text{Pa} = \frac{\text{N}}{\text{m}^2} = \text{Nm}^{-2}$$

(b) **What are the causes of gas pressure?**

Ans. Causes of gas pressure

When we fill a container with a gas, the gas molecules collide with one another as well as with the walls of the container. Thus they exert pressure on the walls of the container. Experiments show that the pressure of a gas depends on its quantity and also on its temperature.

1. Inside the container, if temperature rises, the motion of the molecules and pressure increases due to more collisions of molecules with the walls of the container.
2. On increasing the quantity of the gas in the container, the number of collisions of molecules will also increase thus increasing the pressure in the container. We might have observed that tube of bicycle tyre bursts if it is filled with more air or if it remains standing in hot summer daylight.

The molecules in a gas are not very close together so it is possible to squeeze them together so they take up less space or volume. This is called compressing a gas. It puts the gas under pressure.

(ii) **What is a hydraulic press? Write its application.**

Ans. Hydraulic press

"Hydraulic press is a machine which works on Pascal's principle."

It consist of two cylinder, one of large cross-sectional area, and the other small cross sectional area. Both the cylinder are connected with a tube pistons are fitted at the opening of both the cylinders. When the small piston is moved down with a force it exerts pressure which is transmitted through the fluid to the larger piston moves up and compress the things place over it.

Applications:

Hydraulic press is commonly used to compress row cotton, clothes etc. and also used for forging, stitching, moulding and metal forming operations.

(iii) **Define atmospheric pressure and how it's value changes with the height from the sea level.**

Ans. Atmospheric pressure

The atmosphere because of its weight exerts a pressure on the surface of the earth is called atmospheric pressure

At sea level, the mean density of the air is maximum and the atmospheric pressure is maximum. As we go up from the sea, level the density of the air decreases.

Unit 8

MEASUREMENT OF PHYSICAL QUANTITIES

EXERCISE

(A) Complete the following statement.
 (i) The comparison of something with some standard is known as _____

(ii) 25 milligrams is equal to _____ g.
 (iii) The SI unit for intensity of light is _____.

(iv) In case of measuring water in cylinder, the eye should be kept on a level with the _____ the meniscus.

(v) Meter ruler is used to measure the _____ of an object.

Ans. (i) measurement, (ii) 0.025g, (iii) candela (iv) bottom (v) length

(B) Choose the correct answer for each of the following statement

(i) Which one is not a derived quantity?

- (a) m^2 (b) m
 ✓ (c) s (d) kg

(ii) Which alloy is used in standard metre and kilograms?

- (a) gold and platinum
 (b) platinum and californium
 (c) platinum and cobalt
 ✓ (d) iridium and platinum

(iii) 1 kilo is equal to _____

- (a) 10^2 (b) 10^3 ✓
 (c) 10^6 (d) 10^9

(iv) 1kg is equal to _____

- (a) 100g (b) 1000g ✓
 (c) $\frac{1}{1000}$ g (d) $\frac{1}{100}$ g

(v) 1 kg of water occupies volume of:

- (a) $10dm^3$ (b) $1m^3$ ✓
 (c) $1dm^3$ (d) $100cm^3$

SHORT ANSWERS

(C) Give short answers of the following.
 (i) Write seven base physical quantities along with their SI units.

Ans. Base quantities with their units

Quantity	Units	Symbol
Length	Meter	m
Mass	Kilogram	Kg
Time	Second	s
Temperature	Kelvin	K
Electric current	Ampere	A
Intensity of light	Candela	cd
Amount of substance	Mole	mol

(ii) Write the uses of units in our daily life.

Ans. In our daily life we use the following international units of system, for the measurement:

1. **Meter:** We use meter as a unit for the measurement of length.

2. **Kilogram:** Kilogram is used as a unit for the measurement of mass of different things.

3. **Cubic meter and litre:** In SI units cubic meter (m^3) is the unit for the measurement of volume, the litre is related to cubic meter.

4. **Speed:** In SI units, the unit of time is second (s), which is $\frac{1}{86400}$ part of a mean solar day.

(iii) Why scientists prefer SI units?

Ans. Scientist particularly prefer SI units (system) for the exchange of their scientific researches and information with world's scientific community.

(iv) Convert 1000 centimeters into meters and millimeters.

Ans. Centimeters of meters

A centimeter = $\frac{1}{100}$ meter

1000 centimeter = $\frac{1000^{10}}{100}$ meter

1000 centimeter = 10 meters

Centimeters into Millimeters

1 cm = 10 mm

The distance d in millimeters (mm) is equal to the distance d in centimeters times 10.

$$d(\text{mm}) = d(\text{cm}) \times 10$$

$$d(\text{mm}) = 1000 \text{ cm} \times 10$$

$$d(\text{mm}) = 10000 \text{ mm}$$

OR

$$1 \text{ cm} = 10 \text{ mm}$$

$$1000 \text{ cm} = 1000 \times 10 \text{ mm}$$

$$1000 \text{ cm} = 10000 \text{ mm}$$

(v) Physical quantities are divided in how many categories?

Ans. Physical quantities are those which can be measured. Physical quantities are often divided into two categories, base quantities and derived quantities.

DETAILED ANSWERS

(D) Give detailed answers to the following questions:

(i) What are international system units? How they are used in daily life?

Ans. International system units

The international system of units is a scientific method of expressing the magnitudes or quantities of important natural phenomenon.

These are seven base unit in the system, from which other units are derived. This system was formerly called the meter-kilogram-second system.

1. **Meter:** The standard meter is the length of a platinum – iridium alloy metal rod, kept at 0°C in International Bureau of weight and measurement at servos near tarts.

2. **Kilogram:** Kilogram used for the measurement of mass of different things. The standard kilogram is the mass of platinum – iridium cylinder placed in International Bureau of weight and measurement.

(ii) (a) What is meniscus?

Ans. **Meniscus:** The meniscus is the curve in the upper surface of a liquid close to the surface of the container or another object caused by surface tension.

(b) Give in detail the procedure of measuring the volume of a liquid by reading correct meniscus in the measuring cylinder.

Ans. A measuring cylinder is used to measure the volume of a liquid. It is made up of

transparent plastic or glass which has vertical scale in milliliters (m^1) or cubic centimeters (cm^3).

When a liquid is poured into a cylinder, the volume is read from the scale on the side. The surface of the liquid curves upwards at the point where it touches the inside of the cylinder. The volume is noted on the scale in front of the meniscus of liquid. For correct measurement of the volume, the cylinder must be placed on horizontal surface and the eye should be kept on a level with the bottom of the meniscus.

(iii) What are prefixes? Explain their role in System international units:

Ans. Prefixes

“Prefixes are the words or letters added before SI units such as milli, centi, kilo etc.”

The value of these prefixes are multiple and sub-multiples of 10. Prefixes are used for the inter conversion of smaller units and bigger units.

Role of SI units

(i) Kilo (k) means 1000 (thousand)

(ii) Centi © means $\frac{1}{100}$ (one hundredth part)

(iii) Milli means $\frac{1}{1000}$ (one thousandth part)

When prefix kilo is added before a unit, its value is increased by 1000. e.g.

$$1 \text{ kilometer (km)} = 1000 \text{ meter}$$

$$1 \text{ kilogram (kg)} = 1000 \text{ gram}$$

When prefix centi is added before a unit,

its value in decreased by $\frac{1}{100}$

$$\text{e.g. } 1 \text{ centimeter} = \frac{1}{100} \text{ meter}$$

similarly when prefix milli is added

before a unit its value is decreased by $\frac{1}{1000}$ part.

$$\text{e.g. } 1 \text{ millimeter} = \frac{1}{1000} \text{ meer}$$

$$1 \text{ milligram} = \frac{1}{1000} \text{ gram}$$

Unit 9

SOURCES AND EFFECTS OF HEAT ENERGY

EXERCISE

- (A) Complete the following statement:
 Sun is the main source of _____
 (i) When two surfaces are rubbed against each other _____ is produced.
 (ii) Usually objects _____ on heating and _____ on cooling.
 (iv) In an electric iron, temperature is controlled by using _____
 (v) The bimetallic strip is straight when it is cooled but it _____ when heated.

Ans. (i) heat (energy) (ii) heat
 (iii) expand, contract
 (iv) Bimetallic strip (v) bonds

- (B) Choose the correct answer for each of the following statements.

- (i) Which material will expand on heating?

- (a) solids (b) liquids
 (c) gases (d) all of these ✓

- (ii) At which temperature, volume of water is maximum?

- ✓ (a) 0°C (b) 4°C
 (c) 110°C (d) 100°C

- (iii) Under frozen water, the aquatic life is able to survive in the water because ice acts as an:

- (a) conductor (b) insulator ✓
 (e) semiconductor (d) condenser

- (iv) In Fahrenheit scale, the distance between two fixed points is divided into _____ equal parts or divisions.

- ✓ (a) 100°F (b) 120°F
 (c) 180°F (d) 200°F

- (v) Heat is transferred through:

- (a) conduction (b) convection
 (e) radiation ✓ (d) all of these

SHORT ANSWERS

- (C) Give short answers of the following:
 (i) Define heat. What units are used for its measurement?

Ans. Heat:

Heat is the transfer of kinetic energy from one medium to another medium.

Units for measurement:

The joule is the SI system unit for measuring heat.

$$1 \text{ joule} = 1 \text{ Newton meter} = \frac{1\text{kg}\cdot\text{m}^2}{\text{s}^2}$$

- (ii) Explain the peculiar behavior of water?

Ans. The peculiar behaviour of water plays an important role in the survival of aquatic animals and plants in cold countries. During winter season at as the temperature decreases water at the surface of lakes, rives, sea etc. start contracting. As the water contract it's density increases and it sinks to the bottom.

- (iii) Which component expands on heating in fire alarms and how it works?

Ans. Bimetallic strip of brass and iron is present in fire alarm. When a fire occurs, the heat of fire causes the brass and iron strips to bend, which on bending touches the screw adjacent to it thus completing the circuit. Once the circuit is completed the bell begins to ring.

- (iv) Describe the sources and effects of heat.

Ans. Sources of heat:

- Sun is the main source of heat.
- We get heat from burning of wood, gas etc.
- Electricity is also a source of heat.
- Heat is also produced by chemical reaction.

Effects of Heat:

Heat can cause:

- Changes in the state of matter.
- Chemical changes.
- Expansion is solid, liquid and gases.
- An increase in temperature.

- (v) How Fahrenheit scale is different from Centigrade or Celsius scale.

Ans.

Fahrenheit Scale	Centigrade Scale
<ul style="list-style-type: none"> In this scale the lower standard point or freezing point of ice marked as 32°F and upper standard point or boiling 	<ul style="list-style-type: none"> In this scale the lower standard point or freezing point of ice is marked as 0°C and the upper standard point or

point of water is marked as 212°F at normal atmospheric pressure.	boiling point of water is marked as 100°C at normal atmospheric pressure.
---	---

DETAILED ANSWERS

(D) Give detailed answers to the following questions:

(i) Explain thermal expansion of solids with the help of an activity.

Ans. Thermal expansion of solids

The length and volume of metallic objects expand on heating. The expansion in length due to heating is called linear expansion while that in volume is called volumetric expansion.

Example:

Take a metallic rod about 1 meter in length. Clamp it's one end. Let it's other end rests on a needle. A large needle or a thick wire passes through the end of the straw which acts as a pointer. When the rod is heated by a candle the pointer moves. This indicates that the length of the rod has increased. This example illustrates linear expansion in metallic rod.

(ii) Describe the uses of expansion and contraction of liquids in our daily lives.

Ans. Uses of expansion and contraction of liquids

- Liquids expand on heating and contract on cooling when water is heated from 0°C to 4°C it contracts instead of expanding. When it is further heated from 0°C to 4°C it contracts instead of expanding. When water is cooled down from 100°C to 4°C it contracts. When further cooled from 4°C to 0°C it expands and its volume increases. Under frozen water during winters, the aquatic life is able to survive in the water below the ice because ice acts as an insulation.

A common thermometer in everyday use consists of a glass bulb connected to a thin glass tube called capillary tube when heated. The glass bulb is usually filled with mercury that expands into the capillary tube when heated.

(iii) Give the reasons for the following questions:

(a) Why sag is given in the telephone or electrical wires?

Ans. The telephone wires between two poles hang down in summer and become tight in winter. The wires are laid in such a way that they are allowed to expand or contract. Over head telephones or electrical wires between two poles are given a certain amount of sag so that they can contract in winter without breaking. If there is no sag then wires can break on contraction.

(b) Why mercury is preferred over alcohol in clinical thermometer?

Ans. The liquid expand more as compared to collides. Due to this property, mercury and alcohol are used in thermometers. However, as boiling point of mercury is very high and its expansion is also uniform, that's why it is preferred over alcohol.

(c) Why railway tracks are laid in sections with gaps between them?

(iv) Railway tracks

The railway tracks are laid in section with gaps between them that are joined by fish plates. If there are no gaps in rail tracks then thermal expansion will cause them to bend.

Unit 10

LENSES

EXERCISE

(A) Complete the following:

- A lens which is thick on edges and thin from the centre is called _____
- The distance between principal focus and an optical centre of a lens is called _____
- Concave lens is also known as _____
- The image formed by a convex lens is always _____ and _____
- The problem of short sightedness is removed by wearing spectacles having _____ lenses.

Ans.

- concave
- focal length
- diverging lens
- concave

Choose the correct answer for each of the following statements:

- (β) A ray parallel to principal axis, after refraction from convex lens:
 - (a) does not bend
 - (b) passes through centre of curvature
 - (c) passes through principal focus
 - (d) passes through the centre of lens.

The image formed by a concave lens is always:

- (a) virtual
- (b) real
- (c) inverted
- (d) larger

Pupil of an eye is made smaller or larger by:

- (a) lens
- (b) cornea
- (c) iris
- (d) retina

A line passing through centre of curvature, optical centre and principle focus is called:

- (a) optical centre
- (b) focal length
- (c) focal length
- (d) principal axis ✓

The camera lens forms a ___ image of an object on the film.

- (a) real, small and inverted
- (b) virtual, small and inverted
- (c) real, large and straight
- (d) virtual, large and straight

SHORT ANSWERS

(C) Give short answers of the following:

(i) Describe the paths of the three rays passing through convex lens with the help of ray diagrams.

Ans. 1. When the object is beyond 2F.

The image is formed on the other side of the lens between F and 2F. The image is real, inverted and smaller in size.

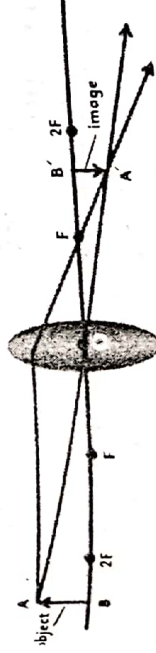


Fig. Object is beyond 2F

2. When object is at 2F.

When object is at 2F, the image is also formed at 2F on the other side of the lens. The image is real inverted and same size.



Fig. Object is at 2F

3. When the object is placed between 2F and F, the image formed beyond 2F on other side of lens.



Fig. Object is between 2F & F

(ii) How the focal length is affected when the lens of an eye becomes thicker?

Ans. When the lens of eye become thicker then focal length is reduced. The person suffers from short-sightedness and cannot see far off objects.

(iii) Draw ray diagrams to show how a converging lens forms images. What are the characteristics of these images?

Ans. 1. When the object is beyond 2F.

The image is formed on the other side of the lens between F and 2F. The image is real, inverted and smaller in size.

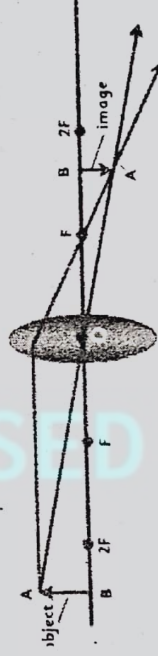


Fig. Object is beyond 2F

2. When object is at 2F.

When object is at 2F, the image is also formed at 2F on the other side of the lens. The image is real inverted and same size.

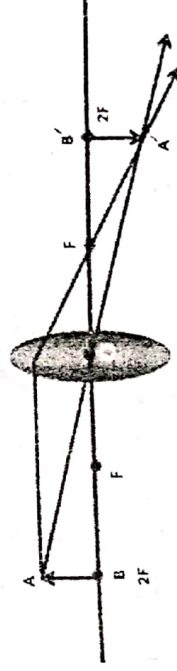


Fig. Object is at 2F

3. When the object is placed between 2F and F, the image formed beyond 2F on other side of lens.



Fig. Object is between 2F & F

(iv) Define the following terms related to a lens along with the diagram.

- (i) Principal axis (ii) Optical centre (iii) Principal focus (iv) Focal length.

Ans. (i) Principle axis:

The point where light rays meet after refraction through lens. It is denoted by 'F'.

(ii) Optical centre:

The mid and central point of lens is called optical centre and denoted by 'O'.

(iii) Principal focus:

Line passing through centre of curvature, optical centre and focal point is called principle axis or optical axis.

(iv) Focal length.

The distance between optical centre 'O' and principle focus 'F' is called focal length denoted by 'f'

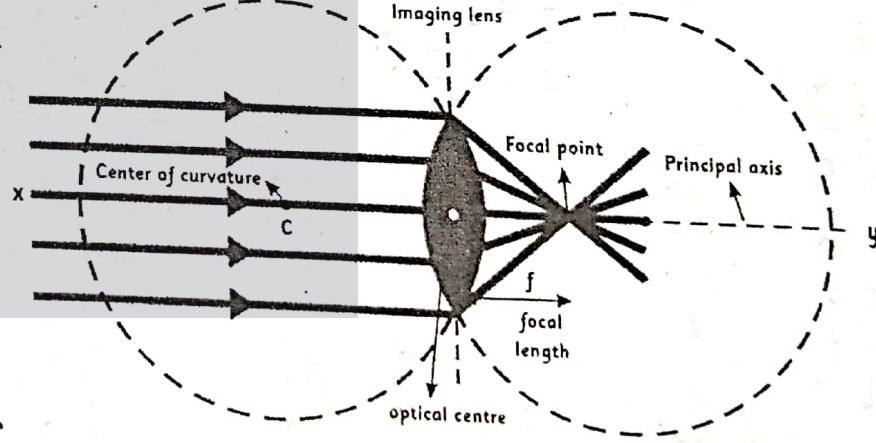


Fig. Convex Lens
(v) Write only two uses of concave lens and convex lens.

Uses of concave lens

- Ans.**
1. Binoculars and telescopes employ convex lenses to magnify objects and more than appear closer.
 2. Opticians use concave lenses to correct near sightedness called myopia.

Use of convex lens:

1. A convex lens magnifies objects.
2. Camera have convex lenses that focus an image on film in a digital camera.

DETAILED ANSWERS

(D) Give detailed answers to the following questions:

(i) Describe the features of a human eye that allows it to see.

(ii) Discuss how the eye and camera are very similar and point out some differences between them.

Ans. (i)

Human eye is a precious gift of Almighty Allah. One can't think of the coloured world without eyes. Eye worse like a camera. It consists of an enclosure having a convex lens at one end and a light sensitive surface, the retina at the other end. The convex lens system of the eye forms a small inverted image of anything is front of it. The iris diaphragm has a pupil is the middle of the eye which controls the amount of light going into the eye. The pupil grows larger to see things in dark, whereas it contracts in bright light. The cornea and the watery fluid behind it do most of the focusing of the rays of light. The lens itself makes small focusing by becoming thinner or thicker. The retina acts like a screen on which inverted image is formed. The optic nerve carries image from the retina to the brain which interprets the image.

Ans. (ii)

Similarities of human eye and camera

The human	Camera
<ul style="list-style-type: none"> • The human eye receives rays of light that penetrates through the pupil to cross the lens and reach the retina. This light is transformed into electrical signals 	<ul style="list-style-type: none"> • A camera also that receives light through the diaphragm of the device, to pass through all the crystals that form the lens and thus reach the CCD

by the photosensitive cells of retina and are sent directly to the brain.	(the place where the concrete image is formed), than it will send to the processor. The processor in a camera would be like air brain.
Human Eye	Camera
• Eye is a live organ for sight.	• Camera is an equipment to capture image.
• Eye uses live cell to detect light.	• Camera uses a diaphragm to detect light and capture image.
• Stereoscopic vision of eyes allows 3 dimensional images.	• Camera capture only 2 dimensional images.
• The pupil adjusts the size while focusing.	• In camera lens moves to change focus.
• Eyes have blind spot.	• Camera do not have blind spot

(iii) Write a note on short sightedness and long sightedness and also explain how to remove these defects using lenses?

Ans. **Short sightedness**

A person suffering from short sightedness cannot see far off objects clearly but can see the nearby objects clearly. The lens of such an eye become thick and the focal length is reduced. Due to this reason parallel rays are focused in front of the retina.

Correction:

Short sightedness can be corrected by wearing spectacles having concave lenses of suitable focal length. As a result, rays are focused on the retina.

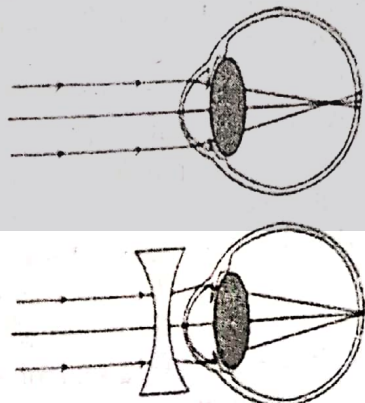


Fig: Short sightedness and it correction

(ii) **Long sighted ness**

A person suffering from long sightedness can not see the near objects clearly but far off objects can be seen clearly. The eye ball becomes thinner or less converging. Due to this reason parallel rays are focused behind the retina.

Correction

This defect can be removed by wearing spectacles having convex lens of suitable focal length which make the rays focused at retina.

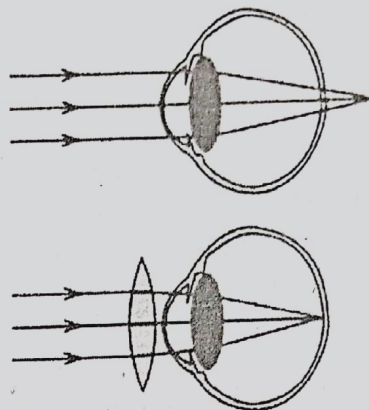


Fig. Long sightedness and its correction

Unit 11

ELECTRICITY IN ACTION

EXERCISE

- (A) Complete the following statement:
- (i) The device that produces electricity is called _____
 - (ii) The part of an electric generator that generates current due to rotation, is called _____
 - (iii) Chemically the electricity is produced by using _____.
 - (iv) The devices that convert electrical energy into other forms of energy called _____
 - (v) Nuclear power is the production of electricity by breaking nuclei some heavy elements like _____

Ans. (i) generator (ii) dynamo
(iii) dry cell and battery
(iv) motor (v) uranium, plutonium

(B) Choose the correct answer for each of the following statements:

- (i) Wind power is the type of electric generation in which _____ used:
- (a) power of wind

- (b) power of water
 (c) power of nuclear
 (d) power of electricity
- (ii) In hydro power, _____ is used to run turbines:
 ✓ (a) moving water
 (b) electrical energy
 (c) wind energy
 (d) heat energy
- (iii) The general generator works on the principle of:
 (a) electrostatic
 (b) electromagnetic induction
 (c) magnetism
 ✓ (d) electromagnetic force
- (iv) Dynamo is a kind of:
 (a) mechanical device
 (b) chemical device
 ✓ (c) electric generator
 (d) none of these
- (v) In the dry cell, zinc acts as:
 (a) positive electrode
 ✓ (b) negative electrode
 (c) electrolyte (d) centre rod

SHORT ANSWERS

(C) Give short answers of the following:

(i) Define electromagnetic induction.

Ans. When there is a relative motion between magnet and a coil of wire, electric current starts flowing in the coil. This phenomenon is called electro-magnetic induction.

(ii) Give few problems in generating electricity.

Ans.

- We have not sufficient amount of water to generate electricity.
- Electrical energy cannot be stored.
- Coal fired power stations cause pollution.
- Generating electricity cause noise pollution.
- Fossil fuels are limited if their use remained continues they will be finished soon.

(iii) How electricity is produced in hydro power stations?

Ans. The stored water at high place of dams. Lakes or canals when allowed to fall on

blades of turbines which are attached to the lower end of the axle of the electric generator make them turn. The generator produces electricity.

(iv) What should be the speed of wind for the production of electricity from a wind mill?

Ans. A steady wind having speed of about 20 km per hour is needed for production of electricity.

(v) Define the following terms:

Resistors, capacitors, diode, transistors and integrated circuit (IC).

Ans. Resistors:

"A resistor is a component that resists the flow of current" resistance is measured in units called ohms and denoted by the symbol (Ω)

Capacitors: A capacitor is a device that can temporarily store an electric charge. Capacitance of a capacitor is measured in farad and denoted by 'F'.

Diode: A diode is a device that let current flow only in one direction. A diode has two terminal called the anode and the cathode.

Transistor: A transistor is a device with three terminal. These are used as switches and amplifiers in an electronic system.

Integrated Circuit (IC)

An integrated circuit is a special device that contains an entire electronic circuit in which transistors, diodes and other elements are photographically engraved into a tiny chip of silicon.

DETAILED ANSWERS

(D) Give detailed answers to the following questions:

(i) How electricity can be generated in daily life?

Ans. Electricity can be generated through generators. Generator is a device that converts mechanical energy into electricity energy.

• **Experiment to show how electricity generated**

Connect a long coil of wire with a galvanometer. Take a bar magnet push it inside the coil quickly, pointing its north pole towards the coil. Keep observing the needle of

galvanometer carefully while pushing the magnet inward. Now pull the magnet backward quickly from the coil. We will observe the deflection of galvanometer in each case which means that the electricity is generated.

(ii) **Make a list of sources of energy and explain any two in detail.**

Ans. **List of sources of energy**

1. Battery
2. Hydropower
3. Wind power
4. Nuclear power
5. Thermal power
6. Solar power.

1. Battery

Generating electricity by means of heat produced by burning of fossil fuels like coal, gas or oil in a thermal power station is called thermal power. In a thermal power station, the heat generated by the burning of fossil fuels is used to convert water into steam. This steam is then used to rotate the steam turbine which in turn rotate the shaft of the connected generator to produce electricity.

2. Hydropower

Generating electricity by means of solar energy is called solar power. Usually solar cell are used for this purpose. When sunlight strikes a solar cell, it develops a voltage for the generation of electricity on large scale, solar panels are used which comprise of many solar cells.

3. Wind power

4. Nuclear power

5. Thermal power 6. Solar power.

(iii) (a) **Explain the direct circuit and alternating current.**

Ans.

Alternating Current	Direct Current
The current which changes its direction is called alternating current.	The current which flow only in one direction is called direct current.

(b) **Which device is used to convert AC to DC?**

Ans. The electrical devices that convert AC to DC are called rectifier.

(c) **What will happen if we do not use converter while using DC operated device into AC outlet.**

Ans. A power converter is an electrical or electro-mechanical device for converting electrical energy. If we have to build a DC operated device and wish to power it from an AC outlet, we must add an AC to DC converter if we do not use power converter then it is impossible to convert electrical energy.

Unit 12

EXPLORING SPACE

EXERCISE

(A) **Complete the following statement.**

- (i) Astronomers use _____ study extremely distant objects.
- (ii) _____ is a craft or machine designed for spaceflight.
- (iii) A _____ is a vehicle designed for the spaceflights.
- (iv) _____ was the first person who stepped on to the moon surface.
- (v) _____ are used for the transportation of space shuttle and space crafts into space

Ans. (i) telescope (ii) space craft
(iii) space craft (iv) Neil Armstrong
(v) space vehicle

(B) **Choose the correct answer for each of the following statements.**

- (i) **Telescope was first time invented in:**
 - (a) England
 - (b) America
 - (c) Russia
 - (d) Nether land ✓
- (ii) **Which technology is used to produce a lighter breathing system for fire-fighters?**
 - ✓ (a) Apollo
 - (b) Cordless
 - (c) Land state and sky lab
 - (d) Global positioning system
- (iii) **The first space shuttle was launched by NASA in:**
 - ✓ (a) 1981
 - (b) 1982

- (c) 1983 (d) 1984
- (iv) The telescope is used to see:
- (a) small objects
 - ✓ (b) distant objects
 - (c) large objects
 - (d) near object
- (v) A space station is distinguished from other spacecrafts by:
- ✓ (a) lack of major landing system
 - (b) colour
 - (c) fuel
 - (d) size

SHORT ANSWERS

(C) Give short answers of the following.

(i) Write the names of different parts of the radio telescope and their functions?

Ans. A radio telescope has several main parts. A dish antenna, a receiver, a detector and an analyzer.

- A dish collects the radio space and focuses them on antenna.
- The receiver takes the radio waves received by antenna and converts them to electrical signals.
- The detector measure the power density of the electrical signals.
- Analyzer is usually a computer on a device that attached to a computer takes the data and creates an image from it.

(ii) Write any three applications of space technology on earth.

Ans. Application

The benefits of space exploration special technology developed for space are new used to improve the quality of life in the following few fields on earth.

1. Health and medicine
2. Global navigation
3. Weather forecast and prediction of natural calamities.
4. Electronics and computers
5. Water reserves

(iii) What are the uses of spectroscope?

Ans. Uses of spectroscope

- Spectroscopes have been used to measure the chemical composition of our sun and the star
- (i) their age (ii) their magnetic field (iii) electric field.
- They have been used to discover and quantify all of the chemical in the periodic table.

(iv) Enlist the problems faced by astronauts in space.

Ans. (i) Weightlessness:

When space craft enter the earth's atmosphere their weight increases by 10 grams for few minutes it can damage human body.

(ii) High cost management:

Cost is major problem in space program. Involvement of private sector in missions could be a possible solutions.

(iii) High temperature are managed by liquid-cooled garments:

For the Apollo program, water cooled garments were developed to protect astronauts from the Moon's high temperature. These garments can reduce body heat by 40-60%

(v) Name the technologies used for space exploration.

Ans. Technologies used for space exploration

1. space rockets
2. Rocket launching pads
3. Telecommunication system

DETAILED ANSWERS

(D) Give detailed answers to the following questions:

(i) Write a detailed note on types of telescope.

Ans. Type of telescope

(a) Optical telescope

An optical telescope gathers and focuses radiations mainly from the visible part of the electromagnetic spectrum. Optical telescopes increase the apparent brightness. Optical

telescopes help photographers, star gazers and astronomers to spot the details of a distant objects.

(b) Radio telescopes

A radio telescope is more sensitive and able to create a visual picture of the signals it receives. Radio telescopes create a picture of the sky, not in visible light, but in radio waves. This is extremely useful device because there are objects that cannot be seen through visible light. A radio telescope has several main parts, a dish antenna, a receiver, a detector and analyzer.

(c) Broad-spectrum telescopes:

Earth's atmosphere blocks out different rays, coming from planets, stars and other heavenly bodies. So, astronomers use telescopes into the space to measure ultraviolet gamma and x-rays as well as visible light and radio waves coming from outer space.

(ii) Explain the benefits of space exploration in detail.

Ans. Space technology has provided many benefits in our everyday life.

(i) Fire-fighting equipment:

Apollo technology has been used to produce a lighter breathing system for fire-fighter.

(ii) Fire-fighting strategy

European space agency satellites provide information on fire locations. This is being used to help develop fire fighting strategy.

(iii) Vision Research:

Land stat and skylab technology is used to check the human eye for refractive error and cornea or lens obstruction.

(iv) Active pixel sensor:

This improved image technology requires less power, is less expensive and smaller than previous technology. It has better image for camcorders, digital cameras, night vision and x-rays.

(v) Archaeology

Space Shuttle radar image help to locate ancient cities, roads and ruins. This helps to pinpoint the archaeological areas faster. This technology helped to locate the lost city of Ubar which is located in Oman.

(a) Why spacecraft is used?

Ans. A spacecraft is a vehicle designed for space flights spacecraft are used for a variety of purposes including communication, earth observation, meteorology, navigation planetary exploration and space tourism. Spacecraft are also known as space ship.

(b) In how many categories, spacecrafts are broadly classified.

Ans. Space craft are broadly classified into two categories:

(i) Robotic space crafts

(ii) Manned space crafts

(i) Robotic space crafts

Robotic space crafts are sent into space for collection of data about space, planets and other celestial bodies. It is controlled from the centre on earth as it does not carry humans in it.

(ii) Manned space crafts

Manual space craft carry equipments alongwith humans to space they contain all the facilities necessary for human survival such as oxygen, food, water and specially built cabins.

(c) Differentiate between the categories of spacecrafts with examples.

(a) Space Rockets: Space rockets are used to for transportation of space shuttles space stations and other space space crafts into space.

(b) Rocket Launching pads: These rockets are launched into space through rocket launching pads. These are specially built platforms for firing rockets into the space. They can withstand extremely high temperature.

The End