APPENDICES

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APPENDIX-I

INSTRUCTIONAL MATERIAL
(Lessons, Handouts and Transparencies)

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TOPIC: Change, growth and decay.

INSTRUCTIONAL OBJECTIVES:

After the instructions are over, students have studied the enrichment and/or remedial material, they in their own words will be able to:

(i) state the meaning of change with examples.
(ii) state the meaning of growth with examples.
(iii) distinguish between growth and change.
(iv) state the meaning of decay with examples.
(v) Discriminate between growth and decay.

PRE-REQUISITE KNOWLEDGE OF STUDENTS:

It is assumed that the students can identify the properties of living objects from the general class of objects.

INSTRUCTIONAL AIDS:

1. Transparency (A) showing definition of growth.
2. Transparency (A) showing definition of change.
3. Transparency (A) showing definition of decay.
4. Transparency (B) showing various stages of growth in man.
5. Transparency (B) showing various stages of growth in plant.
6. Overhead projector.

CONTENT SEQUENCE:

1. Change is the process of variation in living objects.
2. Growth is the process of increase by assimilation of new matter, or development in number, bulk, etc.
3. Decay is the process of deterioration gradually with use in living and non-living objects.

INSTRUCTIONAL PROGRAM:

CONTENT SEQUENCE: (Oi)

Teacher tells the students -
"Today, we will learn something about the process of change."
Teacher asks the learner -
"Have you seen your brother or sister becoming a young boy or girl after some time ?"
"Have you seen seeds being sown in the garden ?"
Student responds -
Teacher gives examples as follows:
- A puppy becomes a dog after some time.
- A kitten becomes a cat after some time.
- A sapling becomes a tree after some time.
Teacher projects a transparency (B) of diagrams showing change before the students. Further, teacher derives the meaning of change and presents it through the transparency (A). Teacher asks students to give some examples of change. Confirmation and/or corrective feedback are provided by the teacher as and when needed.

CONTENT SEQUENCE 2 (OiI):
Teacher tells the students -
"Next we will learn something about the process of growth."
Teacher asks the learner -
"Have you seen your photograph as a small baby ?"
"Have you noticed that the clothes that fitted you last year do not fit you now ?"
"Why did this happen ?"
Student responds.
Teacher explains that this was because every year height and weight of a child increases.
Teacher asks a learner -
"Have you seen a house being constructed ?"
To make the point clearer, teacher explains -
"As each wall is made by laying down bricks one by one, or a pile of stones grows bigger when more chips are added, similarly the body of a child becomes bigger in size."
Teacher asks a student -
"Do you know what is cell division ?"
Student responds.
Teacher explains -
"As each cell divides into two, multiplication of cells takes place and leads to growth."
Teacher shows some diagrams related to growth through the transparency (B), and finally provides a verbal definition of growth. This is supplemented with projection of the definition through the transparency (A).
Teacher asks students to think of some more examples of growth.
Corrective feedback and information are provided and when required.

CONTENT SEQUENCT 1 and 2 (Oiii):

Teacher put forward the next objective before the students-
"Next, we shall distinguish between the processes of growth and change."
Teacher asks the students -
"What is change ?"
"What is growth ?"
Teacher herself recapitulates the definitions of both change and growth.
Teacher gives examples, to explain the difference as follows !
- A baby becomes a woman, but, a woman cannot become a baby. She can only become an old woman.
- All young ones can become adults, adults can only become old.
Teacher concludes -
"Growth is a process of change, i.e., anything that varies.
All changes are not growth."
Teacher further asks students to give some examples showing the difference between growth and change.

CONTENT SEQUENCT 3 (iv):

Teacher tells the class -
"After studying about change and growth, we shall now study about decay."
Teacher asks the learner -
"What are the differences between living and non-living objects ?
"Give examples of living and non-living objects?"

"Why does a pencil become shorter in size as we write with it?"

"Why does skin peel off in winters?"

"Why can an old man not work as hard as a young man?"

Student responds.

Teacher explains -

"An old man cannot work as hard as a young one because with age his energy to work becomes less".

As living objects are doing some work all the time, they get rid of millions of cells from the skin, which leads to deterioration".

Teacher derives the meaning of decay and exhibits the definition on the transparency (A).

Teacher asks students to try to give some other examples of decay. Corrective feedback and/or confirmation are provided as and when needed.

**CONTENT SEQUENCES 2 and 3 (v):**

Teacher presents the final objective before the class -

"Today, finally, we shall study about the relationship between growth and decay".

Teacher asks the learner -

"What is decay?"

"What is growth?"

"If a part of the body gets wounded, it gets healed after some days? Why is it so?"

Student respond.

Teacher explains -

"If we have a cut on our hand, cell division helps in replacing the old cells with new ones and also leads to development of the body. But, non-living objects are different in that they cannot replace themselves what they have lost."

Teacher asks students to give some more examples of this nature. Confirmation and/or corrective feedback are provided as and when required.

**FORMATIVE EVALUATION**

1) Tick mark (✓) the one you think is correct.

Change is the process of -
a) Variation in a living object.
b) Increase by assimilation of new matter.
c) Deterioration with use.

2) Write in front of each the following examples, if you consider them the example of Growth or that of Decay:

a) Increase in height.
b) Peeling off of skin in winters.
c) Calf becomes a cow.
d) Seed becomes a plant.
e) Wearing out of human body with age.

HOME ASSIGNMENT:

1) Read the chapter, "Preservation of self-1" from your textbook from pages 126-128.

2) Draw a diagram on your copies showing the growth of a seed into a plant.
LESSON NO.2

TOPIC: Importance of food and food habits of different animals.

INSTRUCTIONAL OBJECTIVES:
After the instructions are over, learners have gone through the enrichment and/or remedial material, they in their own words will be able to:

i) explain the importance of food in living objects.

ii) relate food and energy in living beings.

iii) discriminate between plant-eaters and flesh-eaters.

iv) explain the food-habits of different animals and plants.

PRE-REQUISITE KNOWLEDGE OF STUDENTS:
It is assumed that the students can identify different types of animals and know the differences between living and non-living objects.

REMEDIAL INSTRUCTION:
Doubts of the students were cleared individually on the basis of their performance in the Formative Evaluation. Students who made no errors were asked to read the remedial material.

INSTRUCTIONAL AIDS:
1. Transparency (F) showing plant-eaters and flesh-eaters.
2. Transparency (C) showing food habits of animals.
3. Transparency (E) showing mouth parts of a mosquito.
4. Transparency (A) showing definitions of plant-eaters and flesh-eaters.
5. Transparency (F) showing food habits of different animals.
7. Transparency (D) showing diagrams of plant-eaters and flesh-eaters.
8. Overhead Projector.

CONTENT SEQUENCE:
1. Living beings need food for maintaining themselves. Food gives them energy which helps them to carry out their life processes. As we work, we need energy and for that we need food. Food enables living beings to carry on their life processes, like, walking, talking etc.
2. Plant-eaters are animals who eat grass, shrubs, plants etc. Examples -
3. **Flesh-eaters** are animals that feed upon flesh of other animals for their food. Examples - lion, tiger, snake, dog.

4. **Procurement of food/Food habits of Animals and Plants**

Different animals obtain food differently.
- **Monkeys** use hands for obtaining food.
- **Lion** kills animals to obtain its food.
- **Mosquitoes** have special mouth parts that enable it to suck blood of human beings and animals which serves as their food.
- **Mushrooms** grow on rubbish dumps and obtain their food from decaying matter.
- **Fungi** are plants that live on organic matter, which is decomposed into simpler form and then absorbed.

**INSTRUCTIONAL PROGRAM**

**CONTENT SEQUENCE 1 : (Oi and Oii)**

Teacher tells the class:
"Today, we shall learn about the importance of food in living objects and relate food and energy in living beings".

Teacher asks the learners -
"What are living objects ?"
"What are non-living objects ?"
"What are the differences between living and non-living objects ?"
"Have you seen non-living objects eating something ?"

Student responds.
Teacher recapitulates student's knowledge about the difference between living and non-living objects as follows :-
"Living objects grow, need food, respire, excrete, reproduce and respond to external influences".
Teacher asks students -
"What is energy?"
"How do living things maintain themselves?"
Students attempt responses.
Teacher explains the relationship of food and energy in living beings. Students are asked to explain the same verbally. Corrective feedback and/or confirmation are provided as and when needed.

**CONTENT SEQUENCE 2 (iii)**
Teacher declares the next objective -
"Next, we shall learn about the difference between plant-eaters and the flesh-eaters".
The teacher shows two groups of animals on the transparency (D) & (F) and asks the students -
"Identify the cause of the differences between them?".
Students attempt responses.
Teacher explains the same as follows:
"One group of animals feed upon plants/shrubs while the other group feeds upon flesh".
Teacher asks students -
"Have you been to a zoo?"
"Have you seen a lion or tiger in the zoo?"
"How many of you are vegetarians?"
Students respond.
Teacher explains the definitions of plant-eaters and flesh-eaters and points out the difference between the two groups of animals through transparency (A).
Teacher asks students to give examples of plant-eaters and flesh-eaters. Confirmation and/or corrective feedback are provided at every point of the discussion.

**CONTENT SEQUENCE 3 (Oiii):**
Teacher tells the students -
"Finally, we shall study about the food habits of different animals".
Teacher asks a student -
"Have you seen a monkey?"
"How does a monkey get food?"
Students respond.
Teacher explains the monkey's mode of getting food which is supplemented with a transparency (C) of the same.
Teacher asks the students -
"Who is known as the king of jungle ?"
"What does a lion feed upon ?"
"How does a lion get food ?"
Student responds.
Teacher explains the lion's mode of obtaining food and supplements it with a transparency (C).
Teacher asks a learner -
"What is malaria ?"
"Which of the common insects causes malaria ?"
"What do mosquitoes feed upon ?"
Teacher explains -
"Mosquitoes have special mouth parts that enable it to suck blood of human beings and animals".
Transparency (E) of mouth parts of mosquito is shown to the students.
Teacher asks -
"What is this ?" (pointing to a mushroom).
"Have you eaten mushrooms ?"
"Do you know from where mushrooms come to Chandigarh".
"What do mushrooms feed upon ?"
Students respond.
Teacher concludes the discussion -
"Mushrooms feed upon rubbish dumps".
Teacher asks learner -
"Have you seen that if pickle is kept for a very long time or a spoon with drops of water on it is put into the jar, a whitish green substance appears on it ?"
"Can you tell what is this whitish green substance ?"
Students make responses.
Teacher explains -
"There are organisms which cannot be seen by a naked eye. These organisms decompose the organic matter, which may be plants or animals into simpler form and then absorb it.
Teacher recapitulates -
"We have studied about the food habits of different animals and plants".
Teacher asks student one by one the food habits of all the organisms that were taught in the class.
Corrective feedback/confirmation are provided as and when the situation arises.

Teacher asks a learner -
"Can you give some examples about the food habits of some other organisms?"
Students attempt to respond.

Teacher tells the students -
"Different species of animals are fast disappearing due to hunting and poaching. You should all pledge to respect and protect wild life throughout your life.

**FORMATIVE EVALUATION**

1. Living objects obtain energy from ________ (food/air).

2. Indicate whether the following animals are plant-eaters (P) or flesh-eaters (F):
   - Cow
   - Snake
   - Tiger
   - Goat
   - Deer
   - Dog
   - Monkey
   - Camel

3. Select by tick mark (✓) the one you consider correct:
   - Mushrooms feed upon -
     a) blood
     b) grass
     c) rubbish dumps.

**HOME ASSIGNMENT:**

1) Read the chapter, "Preservation of Self-1" from your text-book from pages 128-131.

2) Observe the food habits of squirrel, dog, horse, lizard, fly, sparrow and honey bee.

3) Take a piece of bread in your house, soak it in water and observe it after a few days. What happens?
LESSON NO. 3

TOPIC :: Photosynthesis and Insectivorous Plants.

INSTRUCTIONAL OBJECTIVES

After the instructions are over, learners have studied the enrichment and/or remedial material, they in their own words will be able to:

i) state the meaning of chlorophyll.

ii) relate food and chlorophyll in plants.

iii) explain the process of photosynthesis.

iv) outline the various steps of photosynthesis.

v) state the meaning of insectivorous plants.

PRE-REQUISITE KNOWLEDGE OF STUDENTS:

It is assumed that the students know that plants need soil, water and fertilizers for growth and life.

REMEDIAL INSTRUCTION:

Doubts of the students will be removed on the basis of their performance in Formative Evaluation. Students who made no errors were asked to read the remedial material.

INSTRUCTIONAL AIDS:

1. Transparency (G) showing the meaning of chlorophyll.

2. Transparency (G) showing the steps of photosynthesis.

3. Transparency (J) showing the pitcher plant.

4. Transparency (G) showing the meaning of the insectivorous plant.

5. Overhead projector.

CONTENT SEQUENCE:

1. Chlorophyll is the chemical substance present in the leaves of plants. Green plants are green due to the presence of chlorophyll.

Chlorophyll helps plants to make food from simple things, like, CO₂ of
of the air, sunlight and water. In shady places no grass grows. Green patches turn yellow when buried under a stone. This is because plants do not get enough sunlight to make food and thus cannot grow.

2. **Photosynthesis** is a complex process that enables plants to prepare their food. It takes place in the leaves of plants.

3. **Steps of Photosynthesis**:
   i) Energy of the sunlight is trapped by the green plants or chlorophyll.
   ii) In the presence of water and CO$_2$ of the air, food in the form of carbohydrates is produced and O$_2$ is produced as a by-product.

4. **Insectivorous Plants**:
   These are plants that are specially modified to capture insects and small animals.
   "Pitcher plant" and "bladderwort" are some insectivorous plants. Leaves of the pitcher plant are folded in the form of a pitcher with a lid. As the insect alights on the leaf, it gets trapped.

**INSTRUCTIONAL PROGRAM:**

**CONTENT SEQUENCE 1 : (Oi & Oii)**

Teacher informs the class -
"Today, first of all we will learn about chlorophyll in plants and the relationship between food and chlorophyll in plants"

Teacher asks students -
"Would you please name some plants ?".
Students respond.
Teacher notes down their names on OHP transparency.

Teacher asks another student -
"Which of these are the green plants ?"
Student responds.

Teacher asks a student -
"Why are green plants green in colour ?"
No response.
Teacher explains -
"Chlorophyll is a chemical substance present in the leaves of green plants. Chlorophyll causes the green colour in plants".

Teacher asks a learner -
"What is CO₂?"
"What is O₂?"
"How does CO₂ differ from O₂?"
Students attempt to make response.
Teacher asks a student -
"What could be the possible function of chlorophyll?"
Teacher summarizes the discussion -
"Chlorophyll enables green plants to prepare food from simple things like CO₂ of the air, sunlight and water".

Teacher asks a student -
"Can you name the natural source of energy?"
"Why is sunlight essential for plants?"
Students attempt to respond.
Teacher explains -
"As some energy is required by any process, similarly, sunlight provides energy which is required in the process of food preparation by plants".

Teacher asks a student -
"Why do plants not grow in darkness? Why do plants become yellow in the absence of sunlight?"
Students attempt to respond.
Teacher explains -
"In the absence of sunlight, no grass grows in shady places, as these plants are unable to prepare this food. Similarly, green patches turn yellow if buried under a stone."

A transparency (G) showing the meaning of chlorophyll is presented before students. Teacher asks students to tell the meaning of chlorophyll. Confirmation/Corrective feedback are provided as and when the situation arises.
CONTENT SEQUENCE 2 and 3 (Oiii & Oiv):

Teacher declares the next objective as follows -
"Next, we shall learn about the process of photosynthesis and outline its steps".

Teacher asks a student -
"Where do green plants produce food?"
"What helps the green plants to make their food?"
"What is the process by which green plants make their food?"
Students attempt to make responses.

Teacher explains -
"Plants make food by the process of photosynthesis, where "photo" means "light" and "synthesis" means "to make something". Sunlight is therefore, the essential part of this process."

Teacher asks -
"From where do plants obtain energy for photosynthesis?"
Students attempt responses.

Teacher recapitulates -
"Energy of the sunlight is trapped by chlorophyll in leaves of the plants".

Teacher asks -
"What are the factors essential for photosynthesis?"
Student responds. Teacher utilizes the responses and explains -
"In the presence of water and CO$_2$ of air, food is produced and O$_2$ is given off as a by-product."

Teacher asks -
"What are carbohydrates?"
Teacher explains -
"Plants produce food in the form of carbohydrates."

Teacher presents the meaning and steps of photosynthesis though the transparency (G) Teacher evaluates students on the newly acquired ideas.

Confirmation and/or corrective feedback are provided as and when needed.
Teacher tells the class -
"Today the last thing we will learn about is the insectivorous plants."

Teacher asks a student -
"How do the plants obtain their food?"
"Have you seen a plant eating insects or very small animals?"
Students attempt to make responses.
Teacher tells the class -
"There are a group of plants especially modified to capture insects and small animals. They are called insectivorous plants."
Transparency (J) of diagram an insectivorous plant is shown to the students. Also, meaning of the same is presented through transparency (G).
Teacher elaborates as follows-
"Pitcher Plant and Bladderwort are some insectivorous plants. Leaves of the pitcher plant are folded in the form of pitcher with a lid. As the insect comes near the leaf, it gets caught."

Teacher asks a student -
"What are insectivorous plants?"
Confirmation and/or corrective feedback are provided as and when the situation arises.

**FORMATIVE EVALUATION**

1) Chlorophyll is a chemical substance present only in _________ (green/yellow) plants.
2) Photosynthesis helps a plant in ________.
3) Energy required for photosynthesis is obtained from _________.
4) Which gas is needed for photosynthesis?
   i) \( \text{O}_2 \)  ii) \( \text{CO}_2 \)
5) Plants produce food in the form of _______.

**HOME ASSIGNMENT**

2) Keep a pot of plant in a dark room. Observe what happens to it after a day.
LESSON NO.4

TOPIC: - Food chain, Primary producers, Primary consumers, secondary consumers, decomposers.

INSTRUCTIONAL OBJECTIVES:

After the instructions are over, learners have gone through the hand-outs, studied the enrichment and/or remedial material, they in their own words will be able to -

(i) explain the meaning of food chain.
(ii) relate plants and animals with respect to food
(iii) explain the meaning of primary producers with examples.
(iv) advance reasons for green plants functioning as primary sources of food.
(v) explain the meaning of primary consumers with examples.
(vi) explain the meaning of secondary consumers with examples.
(vii) explain the meaning of decomposers with examples.
(viii) discriminate between the meaning of primary producers, primary consumers, secondary consumers and decomposers.

PRE-REQUISITE KNOWLEDGE OF STUDENTS:

It is assumed that the students know the difference among the food habits of different plants and animals fungi and bacteria.

REMEDIAL INSTRUCTIONS:

Doubts of the students will be cleared on the basis of their performance in the formative evaluation. Students who made no errors were given remedial instructions.

INSTRUCTIONAL AIDS:

1) Transparency (D) showing the food pyramid.
2) Transparency (A) showing food chain diagrammatically.
3) Transparency (F) showing food habits of animals.
4) Transparency (G) showing the meaning of food chain, primary producers, primary consumers, secondary consumers and decomposers.
5) Overhead projector.

CONTENT SEQUENCE:

1. Food Chain: In a food chain, one organism forms the source of food for another, which eventually leads to the restoration of raw materials to earth. Green plants and other living organisms are related to one another through this chain.

2. Relationship between plants and animals with respect of food: All animals, including man, depend upon green plants directly or indirectly for food. Rice forms the source of food for mice and mice in turn for the mongoose.

3. Primary Producers: Green plants form the primary source of food in every community as they can synthesize their food from simple raw materials, and therefore, are known as the primary producers.

4. Primary Consumers: They are animals which feed upon plants, like, cow, goat, rabbit.

5. Secondary Consumers: They are animals that depend upon plant-eaters or primary consumers for their food. Lion, tiger, snake, mongoose are examples of secondary consumers.

6. Decomposers: They are organisms that feed upon dead or decaying plants or animals bodies and render their constituents available to the plants. Bacteria and fungi are the decomposers.

INSTRUCTIONAL PROGRAM

CONTENT SEQUENCE 1: (Oi)

Teacher tells the class -
"Today we will learn about the food chain in living beings."

Teacher begins the topic by showing a transparency (D) of food pyramid.

Teacher asks the learner -
"What do plants feed upon?"
"How many types of animals are there as regards their food habits?"
"Would you please name some animals that feed on plants?"
"Name some animals that feed on animals?"
"Name the process by which plants make their food."
"What are the factors essential for photosynthesis?"

Students respond.

Teacher connects the above ideas as follows:

"When one organism forms the source of food for another organism, a chain is formed, known as the food chain. Like this, raw materials, like $\text{CO}_2$, water that plants take from the atmosphere for preparing their food are returned back to the earth by means of the food chain. Hence, food chain helps in maintaining the balance of nature."

Teacher shows a transparency of meaning of food chain (A) to the students and asks them to give some other examples of food chain. Confirmation and/or corrective feedback are provided as and when needed.

CONTENT SEQUENCE 2 : - (Oii)

Teacher tells the students -
"Next, we shall learn about the relationship of food with plants and animals."

Teacher asks the learners -
"How do green plants make their food?"
"What are plant-eaters?"
"Name some flesh-eaters?"

Students respond.

Teacher summarizes the discussion as follows -
"Green plants prepare their own food, but, plant-eaters depend upon plants for their food and flesh-eaters depend upon plant-eaters for their food. This is how animals and plants are related to one another in connection with food."

Teacher shows transparency (F) of animals feeding upon plants and animals feeding upon animals.

Teacher asks students to give some more new examples of plant-eaters and flesh-eaters. Confirmation and/or corrective feedback are provided as and when needed.
CONTENT SEQUENCE 3 (Oiii and Oiv):

Teacher declares the next objective as follows -
"Now, we shall learn something about the primary producers and highlight the reasons as to why they function as primary sources of food."

Teacher asks learners -
"Name some plants that make their own food."
"What does primary mean?"

Students make responses.

Teacher connects the above ideas as follows:
"As primary means first, green plants are known as the primary producers, because they make their food themselves."

Meaning of primary producers is projected on an OHP through transparency (G).

Teacher asks learners -
"What are primary producers?
"Give some examples of primary producers?"

Confirmation and/or corrective feedback are provided as and when the situation demands.

CONTENT SEQUENCE 4 (Ov)

Teacher tells the class -
"Next, we shall learn about the primary consumers."

Teacher asks a student:
"Name some plant-eaters."

Student responds.

Teacher asks -
"What are primary producers?"
"What are consumers?"

Students make responses.

Teacher explains -
"Consumers use something produced by the producers. Plant-eaters, like, cow, goat, rabbit are primary consumers as they feed upon the plants for their food.

Transparency (G) of the meaning of primary consumers is projected before the students.
Teacher asks students -
"What are primary consumers ?"
"Name some primary consumers ?"
Students respond.
Confirmation and/or corrective feedback are provided as and when required.

CONTENT SEQUENCE 5 (Ovi) :
Teacher declares the next objective as follows :
"After learning about primary producers and primary consumers, we shall learn about the secondary consumers".
Teacher asks students -
"What are plant-eaters ?"
"What are primary consumers ?"
"Name some flesh-eaters ?"
"What does secondary mean ?"
Students make responses.
Teacher describes -
"Secondary means anything that comes after the first. As the flesh-eaters feed upon the primary consumers or the plant-eaters, they are known as the secondary consumers."
Teacher projects the meaning of secondary consumers on the OHP through transparency (G).
Teacher asks learners -
"What are secondary consumers ?"
"Give some examples of secondary consumers ?"
Students make responses.
Confirmation and/or corrective feedback are provided as and when the situation demands.

CONTENT SEQUENCE 6 : (Ovii) :
Teacher tells the students -
"Next, we shall learn about the decomposers."
Teacher asks students -
"What are bacteria ?"
"What are fungi ?"
Students make responses.
Teacher asks a learner -
"What does decompose mean?"
Students attempt to make a suitable response.
Teacher connects the above ideas as follows -
"Bacteria and fungus feed upon the dead plants or animals for their food. They decompose
the body of dead animals and plants by secreting some juices and causes it to
be converted into the constituent elements, that is, CO₂ and H₂O, hence, returning
the raw materials of the earth, which had been used for making food by the primary
producers. Bacteria and fungus are therefore known as the decomposers." 
Meaning of decomposers is projected by the teacher on the screen through the transpa­
rency (G).
Teacher asks the students -
"What are decomposers?"
"Name some decomposers?"
Students make responses.
Confirmation and/or corrective feedback are provided as and when required.

CONTENT SEQUENCE 3, 4, 5, 6 COMBINED (Oviii):

Teacher puts forward the final objective of the lesson as follows:
"Finally, we shall discuss the relationship between primary producers, primary
consumers, secondary consumers and decomposers."
Teacher asks the learners -
"What is a food chain?"
"What are primary producers?"
"What are primary consumers?"
"Explain secondary consumers?"
"Explain decomposers."
Students make responses.
Teacher explains the relationship between the above ideas as follows -
"Primary consumers depend upon primary producers for their food. Secondary consumers
depend upon primary consumers for their food. Decomposers feed upon the dead plants
and animals. This is how the food chain is formed."
Teacher projects a transparency (A) exhibiting the relationship between plants and animals regarding food, diagrammatically.

Teacher asks a student -
"How are the primary producers and the primary consumers related?"
"How are the primary consumers and secondary consumers related?"

Students respond.

Confirmation and/or corrective feedback are provided as and when required.

**FORMATIVE EVALUATION:**

1) Tick mark the one you consider is correct.

   Primary producers -
   a) make their own food.
   b) feed upon plant-eaters
   c) feed upon flesh-eaters.

2) Lion is a _______ (primary/secondary) consumer.

3) Fungus is example of _______ (decomposers/producers).

4) Primary— __________ Primary ________ ? ________ → Decomposers

   →Primary_________Producers
   Consumers

**HOME ASSIGNMENT:**

1) Read the instructional material.

2) Read pages 132-133 in your text-book from the chapter, "Preservation of Self - 1".
LESSON NO. 4
HAND-OUT

PRIMARY PRODUCERS
Green plants form the first source of food in every community as they can make their own food from simple raw materials.

PRIMARY CONSUMERS
They are animals that feed upon plants.

SECONDARY CONSUMERS
They are animals that feed upon plant-eaters or the primary consumers for their food.

DECOMPOSERS
They are organisms that feed upon dead or decaying plants or animal bodies and return back the raw materials of the earth.

FOOD CHAIN

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RICE | MICE | MONGOOSE
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In a food chain, one organism forms the source of food for another organism, which eventually leads to the restoration of raw materials to the earth.
INSTRUCTIONAL OBJECTIVES:
After the instructions are over, learners have attended to the enrichment and/or remedial material, they in their own words will be able to:

(i) explain the meaning of ingestion.
(ii) explain the meaning of digestion.
(iii) state the meaning of absorption.
(iv) identify the type of food absorbed by the body.
(v) explain the meaning of egestion.
(vi) discriminate between ingestion, egestion and digestion.
(vii) identify the parts of the digestive system.

PRE-REQUISITE KNOWLEDGE OF STUDENTS:
It is assumed that the students know the importance of food for maintaining the various body processes of living organisms.

REMEDIATION:
Doubts of the student will be cleared on the basis of their performance in the formative evaluation. Students who made no errors were asked to read the remedial material.

INSTRUCTIONAL AIDS:
1. Transparency (I) showing the digestive system of man.
2. Transparency (I) showing the absorption of food.
3. Transparency (H) showing the meaning of ingestion, absorption, digestion, egestion and digestive system.
4. Overhead projector.

CONTENT SEQUENCE:
1. Ingestion: is the process of taking food inside the body.
2. Digestion: is the process of breaking down ingested food into simpler constituents.
3. Absorption: is the process of absorbing food inside the body. Only digested food is absorbed by the body.
4. Egestion: is the process of throwing the undigested part of the food outside the body.
5. **Digestive System**: is made up of various organs, like, liver, oesophagus, stomach, large intestine, small intestine and rectum.

**INSTRUCTIONAL PROGRAM**

**CONTENT SEQUENCE 1 : (Oi):**
Teacher declares the objective as follows:
"First of all, today, we shall discuss about ingestion."
Teacher asks students -
"Why do we eat food?"
Students respond.
Teacher asks a learner -
"What is the biological name for taking food inside the body?"
Teacher explains -
"Taking food inside the body is known as ingestion, biologically."
Transparency (H) showing the meaning of ingestion is projected on the OHP.
Teacher asks a student -
"What does ingestion mean?"
Student responds.
Confirmation and/or corrective feedback are provided as and when the situation arises.

**CONTENT SEQUENCE 2 : (Oii)**
Teacher tells the class -
"Next, we shall learn about digestion."
Teacher asks a student -
"What is ingestion?"
"Does the body use the food in the same form that it is ingested?"
Students make responses.
Teacher explains as follows -
"The body cannot use the food in the same form in which it is taken. The food is broken down into simpler constituents by the process of digestion. When we cook vegetables, we use the leaves (spinach), seeds (peas), roots (carrot) and not the entire plant. Similarly our body uses some part of the ingested food and the remaining is thrown out of the body."
Teacher presents the meaning of digestion through the transparency (H).
Teacher asks -
"What is digestion ?"
Student makes response.
Confirmation and/or corrective feedback are given at every stage.

**CONTENT SEQUENCE 3 (Oiii and Oiv):**
Teacher declares the next objective as follows:
"After learning about ingestion and digestion, we shall learn about absorption."
Teacher asks the students -
"What is ingestion ?"
"What is digestion ?"
"After digestion, how does the body use the food ?"
Students make responses.
Teacher explains -
"After digestion, the food in simpler form is absorbed by the body. From the walls of the intestine, the digested simple food passes into the blood stream of the body. This process is known as absorption."
Teacher shows a transparency (H) of the meaning of absorption and a diagram showing absorption of food through another transparency (I).
Teacher asks a student -
"What is absorption ?"
Student responds.
Confirmation and/or corrective feedback are provided when the situation arises.

**CONTENT SEQUENCE 4 : (Ov) :**
Teacher says to the class -
"Now, we shall learn about the process of egestion."
Teacher asks students -
"Does our body use all the food that we take inside our body ?"
Student responds.
Teacher asks another student -
"What does our body do with the undigested part of the food that has been ingested ?"
Students attempt responses.
Teacher describes -
"Undigested part of the ingested food is thrown out of the body by means of egestion, because if this undigested food is allowed to remain in the body, it causes harm."
Teacher projects the meaning of egestion through the transparency (H).
Teacher asks a student -
"What is egestion ?"
Student makes response.
Confirmation and/or corrective feedback are provided as and when the situation arises.

**CONTENT SEQUENCE 1, 2, 4 combined : (Ovi) :**
Teacher tells the class -
"Now, we shall distinguish between ingestion, digestion, egestion."
Teacher asks students -
"What is ingestion ?"
"What is digestion ?"
"What is egestion ?"
Students make responses.
Teacher summarizes the relationship between the ideas as follows -
"Ingestion is taking in of food, digestion is breaking down of food into simpler constituents and egestion is throwing out of the undigested food from the body."
Teacher asks students -
"How do egestion and digestion differ ?"
"How do ingestion and egestion differ ?"
Students make responses.
Confirmation and/or corrective feedback are provided as and when the situation arises.

**CONTENT SEQUENCE 5 : (Ovii) :**
Teacher tells the class -
"Finally, we shall study about the digestive system of man."
Teacher asks the student -
"After ingestion, where does the food go inside the body ?"
Students attempt responses.
Teacher explains -
"Just as we have organs for walking, talking, looking, smelling, we have got special organs for digestion, absorption and egestion inside our body"
Teacher shows the transparency (I) of the diagram of digestive system of man. Teacher points out the various parts of the digestive system on the transparency and asks students to note these down on their note-books. Also, the students are asked to draw the diagram of digestive system of man on their note-books. Teacher asks students - "Name the parts of the digestive system ?" "Where does absorption of food take place ?" Students make responses. Confirmation and/or corrective feedback are provided as and when the situation demands.

**FORMATIVE EVALUATION**

1) Intake of food is called ________________(ingestion/egestion)

2) Tick mark the one you think is correct.
   Absorption is ________________.
   a) sucking in of food by the blood vessels.
   b) breaking down of food into simpler constituents.

3) Put a tick mark (✓) in front of the digestive organs of the man :
   a) Liver
   b) Nose
   c) Stomach.
   d) Small Intestine.

**HOME ASSIGNMENT**

1. Draw the diagram of the digestive system of man on your note-book.
2. Read the instructional material.

3. Read pages 133-134 in your text-book of the chapter, "Preservation of Self-1".
LESSON NO.6

TOPIC: Respiration, enzymes and nutrients.

INSTRUCTIONAL OBJECTIVES:

After the completion of classroom instructions, and students have attended to the text and related enrichment material, students in their own words will be able to:

(i) state the meaning of breathing.
(ii) identify the gases related with breathing.
(iii) define respiration.
(iv) relate respiration with internal combustion.
(v) state the meaning of enzymes.
(vi) explain the function of enzymes.
(vii) explain the importance of nutrients.
(viii) discriminate between the examples of nutrients.

PRE-REQUISITE KNOWLEDGE OF STUDENTS:

It is assumed that the learners know that oxygen is necessary for life, and that food is essential for animals and man in order to provide nourishment, energy and growth to the body.

REMEDIAL INSTRUCTION:

Doubts of the students will be cleared on the basis of their performance in the formative evaluation. Students who made no errors were asked to read the remedial material.

INSTRUCTIONAL AIDS:

1) Transparency (K) showing diagram of exhaled air turning lime water milky.
2) Transparency (K) showing path of air inside the lungs of man.
3) Transparency (L) showing meaning of nutrients and its types, meaning of respiration types of breathing and meaning and function of enzymes.
4) Overhead projector

CONTENT SEQUENCE:

1. Breathing is taking in and expelling of air from the mouth and nose.
Inhaling is breathing in of air ($O_2$) and
exhaling is breathing out of air ($CO_2$)

2. Respiration is the process by which complex food is broken into carbon dioxide
and water, leading to the release of energy-rich packets for bodily functions.

**CHEMICAL REACTION OF RESPIRATION**:

$$\text{Complex food} + O_2 \rightarrow CO_2 + H_2O + \text{Energy}$$

3. Enzymes are chemical agents that are specific in action and speed up a chemical
reaction.

4. Nutrients provide nourishment to the body for performing various functions
of the body.

5. **Types of Nutrients**: There are 3 types of nutrients:
   i) Carbohydrates used for obtaining energy
   ii) Fats used for obtaining energy.
   iii) Proteins for growth of the body.

**INSTRUCTIONAL PROGRAM**

**CONTENT SEQUENCE I (Oi and Oii)**:

Teacher declares the first objective of the lesson as follows -
"First, we shall study about the meaning and types of breathing."

Teacher asks a student -
"What is the difference between the two gases: Oxygen and Carbon di-oxide?"
Student responds.

Teacher asks another student -
"What is breathing?"
Student responds.

Teacher coordinates and uses the answers and explains -
"Breathing is taking in and expelling of air from nose and mouth."

Teacher asks a student -
"What gas do we breathe in?"
Student responds.

Teacher asks another student -
"What gas do we breathe out?"
Student responds.
Teacher explains -
"Breathing in of air, \((O_2)\) is known as inhaling, whereas breathing out of air, \(CO_2\), is known as exhaling."
Teacher shows a transparency \((K)\) of a diagram showing how exhaled air turns lime-water milky due to \(CO_2\). Transparency of types of breathing is also shown to the students.
Transparency \((K)\) of path of air inside the lungs is also shown to the students.
Teacher asks students -
"What is breathing?"
"What is inhaling?"
"What is exhaling?"
Students make responses.
Confirmation and/or corrective feedback are provided as and when required.

**CONTENT SEQUENCE 2 (Oiii and Oiv):**

Teacher tells the class -
"Next we shall study about the process of respiration."
Teacher asks students -
"How does man obtain energy?"
"What does man burn for getting energy?"
Students give partial responses.
Teacher describes -
"Man obtains energy for performing the various body functions from the food he eats. Complex food is broken down into \(CO_2\) and \(H_2O\), leading to the release of energy-rich packets for body functions. This process is called respiration."

Teacher shows the chemical reaction of respiration to the students by writing it on a transparency. Also, the transparency \((L)\) showing the meaning of respiration is projected before the students.
Teacher asks a student -
"Define respiration?"
"What gas is required for burning complex food in the body?"
Students respond.
Confirmation and/or corrective feedback are provided at every stage.

**CONTENT SEQUENCE 3 (Ov and Ovi):**

Teacher says -
"Next, we shall study about enzymes."

Teacher asks students -
"What is a chemical process?"
"Name a chemical process that takes place in our body?"

Students make responses.

Teacher elaborates the above ideas as below -
"Digestion and respiration are both chemical processes that take place inside the body of man."

Teacher tells the class -
"Do you know that any chemical process in our body is speeded up due to the presence of some agents?"

Students confused.

Teacher discusses the above idea as follows -
"Chemical reactions, like, respiration and digestion are speeded up by some chemical agents known as enzymes. Enzymes are specific in action, i.e., the enzymes that help in digestion are different from those that help in respiration."

Transparency (L) showing the meaning of enzymes is exhibited before the students.

Teacher asks a student -
"What are enzymes?"

"Are enzymes for speeding up respiration similar to the ones for digestion?"

Confirmation and/or corrective feedback are provided as and when the situation demands.

**CONTENT SEQUENCE 4 & 5 (Ovii and Oviii):**

Teacher informs the class of the final objective -
"Finally, we shall study about nutrients."

Teacher asks the students -
"Why do we eat food?"

"Name the different types of food stuffs that you know."

Students make responses.

Teacher explains -
"Man needs food for maintaining his body functions. Carbohydrates and fats are used for obtaining energy. Proteins are used for building up of body parts i.e., growth or repair of body tissues." Teacher gives examples of the types of food stuffs to the students and asks them to note down on their copies through the transparency (L).

Teacher concludes - "Hence, nutrients are food stuffs that provide nourishment to the body for performing various body functions, Carbohydrates, fats and proteins are the types of nutrients." Teacher asks - "What are nutrients ?" "What are carbohydrates ?" "What are proteins ?" "What are fats ?" Students make responses.

Confirmation and/or corrective feedback are provided as and when the situation arises.

FORMATIVE EVALUATION :
1. Breathing out of air is called -
   a) inhaling.
   b) exhaling.
2. Complex food is broken down into CO₂ and H₂O by the process of -
   a) respiration
   b) digestion.
3. Enzymes help in __________________ (slowing down/speeding up)
   a chemical process.
4. Proteins help in -
   a) providing energy for the body.
   b) growth of the body.
5. Carbohydrates, fats and proteins are the __________________(nutrients/enzymes).

HOME ASSIGNMENT :-
1. Read the instructional material.
2. Read pages 134-135 in your Biology text-book from the Chapter, "Preservation of Self - 1".
LESSON NO.7

TOPIC: Respiratory organs of animals and plants.

INSTRUCTIONAL OBJECTIVES

After the instructions are over, students have gone through the text and the related enrichment/remedial material, students in their own words will be able to:

(i) explain the meaning of respiratory organs.
(ii) describe lungs of man.
(iii) explain the function of lungs.
(iv) identify parts of respiratory system of man.
(v) state the meaning and function of gills.
(vi) state the location and function of operculum.
(vii) outline the steps in respiratory process of fish.
(viii) describe trachea of insects.
(ix) explain the function of trachea in insects.
(x) describe stomata of plants.
(xi) identify the causes of environmental pollution and ways to curb it.

PRE-REQUISITE KNOWLEDGE OF STUDENTS:

It is assumed that the students know the meaning and importance of respiration in living beings.

REMEDIAL INSTRUCTION:

Doubts of the students were cleared on the basis of their performance in formative evaluation. Students who made no errors were asked to read the remedial material.

INSTRUCTIONAL AIDS:

1. Transparency (K) showing lungs.
2. Transparency (M) showing gills and operculum in fish.
3. Transparency (M) showing trachea of insects.
4. Transparency (O) showing stomata (V.S. of leaf).
5. Transparency (N) showing meaning of respiratory organs and functions of lungs, gills, trachea and stomata.
6. Overhead projector.
CONTENT SEQUENCE:

1. **Respiratory organs**: are organs that help animals and plants to perform respiration which is necessary for life. They bring about exchange of gases (O₂ & CO₂) inside the body.

2. **Lungs**: are the respiratory organs of man. Exchange of gases takes place in the surface of the lungs, that are richly supplied with blood vessels. Lungs are the most common respiratory organs in higher animals.

3. The respiratory system of man is comprised of 3 main parts: nasal passage, trachea and lungs.

4. **Gills**: are the respiratory organs of fish. They are comb-like and deep-red in colour, present on each side of the head. Gills are covered by a hard movable plate, called operculum.

5. **Steps in respiration of fish**: Water enters through the mouth, bathes the gills and passes out through the opening of the operculum. Blood present in the gills takes in oxygen dissolved in water and gives out carbon dioxide.

6. **Trachea**: are the respiratory organs of insects. Insects have paired openings in several body segments which open to the outside and within into a network of trachea. Here, gaseous exchange takes place between the body cells and outside air.

7. **Stomata**: are the respiratory organs of plants. They are openings present on the lower surface of the leaf and through this gaseous exchange takes place.

8. **Environmental pollution**: is caused by the poisonous gases emitted by industries. More and more trees should be grown so that the oxygen of the environment is replenished.

INSTRUCTIONAL PROGRAM

CONTENT SEQUENCE 1 (Oi):
Teacher tells the class -
"Today, we shall discuss the meaning of respiratory organs."
Teacher asks students -
"What is respiration ?"
"Can you name the organs used for respiration ?"
Students respond.
Teacher explains -
"Organs that help plants and animals, or all living beings, in general, for
respiration are known as the respiratory organs."
Teacher asks students -
"Is breathing a part of respiration ?"
"What gases are exchanged in breathing in man ?"
Students make responses.
Teacher elaborates as follows -
"Respiratory organs bring about breathing or the exchange of gases inside the body
of living beings".
A transparency (N) showing the meaning of respiratory organs is presented to the
students.
Teacher asks a student -
"What are respiratory organs ?"
Confirmation and/or corrective feedback are provided as and when the situation arises.

CONTENT SEQUENCE 2 and 3 (Oii and Oiii and Oiv) : 

Teacher informs the next objective to the class -
"Next, we shall study about the respiratory organs of man".
Teacher asks students -
"What is breathing ?"
"Where does man breathe from ?"
"What is respiration ?"
"What are respiratory organs ?"
Students make responses.
Teacher asks a student -
"Can you name the respiratory organs of man ?"
Teacher explains -
"Respiratory organs of man are a pair of lungs "

Teacher projects a transparency (K) of the diagram of lungs to the students and points
out the parts, (i.e., nasal passage, trachea and lungs) of the respiratory system.
Simultaneously the teacher explains -
"Exchange of gases takes place in the surface of the lungs that is richly supplied with blood vessels. Lungs are the most common respiratory organs in the higher animals".

Teacher shows the function of lungs to the students on the transparency (N).

Teacher asks students -
"What are lungs ?"
"What are the function of lungs ?"
Corrective feedback and/or corrective feedback are provided whenever the situation arises.

CONTENT SEQUENCE 4 (Ov and Ovi):

Teacher declares the next objective :-
"Next, we shall study about the respiratory organs of fish."
Teacher asks a student -
"Have you seen a fish ?"
Student responds.
Teacher asks another student -
"Why cannot a fish live without water ?"
Students know the phenomenon well, but are not in a position to explain it
Teacher explains -
"Fish takes in oxygen dissolved in water. It cannot breathe in the oxygen of air directly. That is why it cannot live without water"

Teacher asks a student -
"Can you name the respiratory organs of fish ?"
No response.
Teacher projects a transparency (M) of the diagram of gills of fish to the students and explains -
"Gills are the respiratory organs of fish. They are deep-red in colour, present on each side of the head of fish. They are covered by a hard movable plate called the operculum."
Teacher asks students -
"What are the gills covered by ?"
Students make responses.
Teacher provided confirmation/corrective feedback as the situation demanded.

CONTENT SEQUENCE 5 : (Ovii) :

Teacher declares the next objective as follows:
"After studying about the respiratory organs of fish, we shall study about the steps of respiration in the fish."

Teacher asks -
"What is respiration?"
"What gas in the air is essential for life?"
"What organs help a fish in respiration?"

Students make responses.
Teacher asks a student -
"How does a fish respire?"

No response from the students.
Teacher projects the transparency (M) of diagram of gills to the students and simultaneously discusses the steps in the respiration of fish as follows:

"Step 1 : Water enters through the mouth of fish containing dissolved $O_2$ and bathes the gills.

Step 2 : Blood present in the gills takes in oxygen dissolved in the water and gives out carbon-dioxide.

Step 3 : Water containing $CO_2$ passes out through the opening of operculum."

Teacher shows the above steps through the transparency (N) and asks students to note it down and refer to the hand-outs.

Teacher asks students -
"What is the first step of respiration in fish?"
"Where does gaseous exchange occur in fish?"
"From where does the water come out that contains dissolved $CO_2$?"

Students make responses.
Confirmation and/or corrective feedback are provided as and when needed.
CONTENT SEQUENCE 6: (Oviii and Oix):

Teacher puts forward the next objective before the class -
"Next, we shall learn about the respiratory organs of insects."
Teacher asks the students -
"Have you seen a cockroach?"
"What category of animals does it fall in?"
"Can you name some insects?"
Students make responses.
Teacher asks a student -
"What are the respiratory organs of insects?"
Teacher shows a transparency (M) of the diagram of trachea to the students and explains -
"Insects have paired openings in several body segments which open to the outside and inside into a network of trachea. Here, gases are exchanged, oxygen is taken in and CO₂ is given out between the body cells and outside air."
Teacher shows a transparency (N) of the function of trachea to the students -
Teacher asks students -
"What are the respiratory organs of insects?"
"Where does gaseous exchange take place in insects?"
Students make responses.
Confirmation and/or corrective feedback are provided as and when needed.

CONTENT SEQUENCE 7 (Ox):

Teacher declares the next objective as follows -
"Finally we shall study about the respiratory organs in plants."
Teacher asks students -
"Name the various parts of a plant?"
"Where does photosynthesis take place?"
Students make responses.
Teacher asks a student -
"Where does respiration take place in plants?"
No response.
Teacher explains with the help of transparency (O) diagram of stomata -
There are openings present on the lower surface of the leaf, known as stomata, that are the respiratory organs of plants. Here, gaseous exchange takes place, wherein \( \text{O}_2 \) is taken in and \( \text{CO}_2 \) is given out.

Teacher asks students -
"What are stomata?"
"Which surface of the leaf are the stomata present?"
"What gas is given out by plants during respiration?
Students make responses.
Teacher provides confirmation and/or corrective feedback at every step of the discussion.

CONTENT SEQUENCE 8 (Oxi):

Teacher puts forward the final objective -
"Finally, we shall study about the cause of environmental pollution and ways to curb it."
Teacher asks students -
"What are the products of photosynthesis?"
"What is the gas inhaled?"
"Which gas is exhaled?"
Students respond.
Teacher explains -
"The oxygen of the atmosphere so essential for respiration is replenished by the activity of green plants. Oxygen is a product of photosynthesis. Due to \( \text{CO}_2 \) and other harmful gases given out by the industries, the atmosphere/environment gets polluted. To counter act this problem, more and more trees must be grown and felling of trees should be avoided as much as possible."
Teacher asks students -
"How can oxygen of the atmosphere be replenished?"
"How can environmental pollution be avoided?"
Teacher provides confirmation/corrective feedback as the situation demands.
FORMATIVE EVALUATION

1) Respiratory organs of man are called ________________ (Lungs/trachea).

2) Gills are respiratory organs of ________________ (fish/insects).

3) Fish takes in ________________ (O₂/CO₂) dissolved in water.

4) Stomata are the respiratory organs of ________________ (Plants/animals).

5) Stomata are present on the ________________ (Upper/lower) surface of leaf.

HOME ASSIGNMENT:

1) Draw the diagram of respiratory organs of man.
2) Read the instructional material.
3) Read pages 135-136 in your text-book from the chapter, "Preservation of Self-1".
These are organs that help animals and plants to perform respiration which is necessary for life. They bring about exchange of gases ($O_2$ & $CO_2$) inside the body.

**LUNGS**
Lungs are the respiratory organs of man. Exchange of gases takes place in the surface of the lungs, that are richly supplied with blood vessels.

**GILLS**
Gills are the respiratory organs of fish. They are comb-like and deep-red in colour present on each side of the head. Gills are recovered by a hard movable plate, called operculum.

**STEPS IN RESPIRATION OF FISH**
Water enters through the mouth, bathes the gills and passes out through the opening of the operculum. Blood present in gills takes in oxygen dissolved in water and gives out $CO_2$.

**TRACHEA**
Trachea are the respiratory organs of insects. They have paired openings in several body segments which open to the outside and within into a network of trachea. Here, gaseous exchange takes place between the body cells and outside air.

**STOMATA**
Stomata are the respiratory organs of plants. They are openings present on the lower surface of the leaf and here gaseous exchange takes place.
TOPIC : Transport system in plants and animals.

INSTRUCTIONAL OBJECTIVES:

After the instructions are over, learners have gone through the hand-outs, studied the enrichment and/or remedial material, they in their own words will be able to:

(i) describe circulatory system of man.
(ii) describe blood vessels in man.
(iii) explain the function of blood vessels.
(iv) state the meaning of heart.
(v) explain the function of heart and its relationship with blood circulation.
(vi) explain the meaning of cytoplasmic streaming
(vii) distinguish between the types of conducting vessels in plants.
(viii) explain the meaning of vascular bundle in plants.

PRE-REQUISITE KNOWLEDGE OF STUDENTS:

It is assumed that the learners know the meaning of blood, digestion, respiration and photosynthesis.

REMEDIAL INSTRUCTION:

Doubts of the students were cleared individually on the basis of their performance in the formative evaluation. Students who made no errors were given remedial instructions.

INSTRUCTIONAL AIDS:

1) A leaf of a rose plant.
2) Transparency (P) showing the diagram of circulatory system of man.
3) Transparency (R) showing unicellular animals, like, amoeba, euglena and paramecium.
4) Transparency (O) showing vascular bundle in V.S. of leaf.
5) Transparency (O) showing parts of a flowering plant.
6) Transparency (Q) showing the meaning of circulatory system, blood vessels, relationship between heart and blood circulation, conducting vessels in plants and vascular bundle.
1. **Circulatory System** - enables materials to be carried from one part of the body to another. As an organism becomes complex, the need for an elaborate system of transport arises.

2. **Blood vessels** - carry blood to and from the various parts of the body. They are of two types.

3. **Arteries** - are blood-vessels that carry oxygen-rich blood from heart to various body parts.
   - **Veins** - are blood-vessels that carry carbon dioxide-rich blood from various body parts to the heart.

4. **Heart** - is the central organ of blood circulation. It beats constantly.

5. **Relationship between heart and blood circulation** - Heart pumps blood to all parts of the body by arteries and blood from various organs comes back to heart through the veins.

6. **Cytoplasmic streaming** - is the term given to the transport system in the unicellular animals, like amoeba.

7. **Conducting Vessels in Plants** - are of two types.
   - **Xylem** - carries water and minerals absorbed by roots to various parts of the plant.
   - **Phloem** - carries food materials prepared by leaves to various parts of the plant.

8. **Vascular Bundle** - together xylem and phloem form the vascular bundle.

**INSTRUCTIONAL PROGRAM**

**CONTENT SEQUENCE 1** (Oi):

Teacher tells the class -
"Today, first we shall study about the transportation system or the circulatory system in our body."

Teacher asks students -
"What does transport mean?"
"What is digestion?"
Students respond.
Teacher asks a student -
"Can you tell how the digested food material is carried from one part of the body to another?"
Students confused.
Teacher explains -
"Digested food material passes into the blood from the intestinal walls and is then carried from one part of the body to another."
Teacher asks another student -
"What does respiration mean?"
Student responds.
Teacher asks another student -
"How is O\textsubscript{2} carried from the lungs to various parts of the body?"
Students attempt partial responses.
Teacher explains -
"Oxygen from the lungs is carried to other parts of the body for respiration, as all the living cells respire."
Teacher asks a student -
"What is this process called when materials like, digested food and O\textsubscript{2} are carried from one part of the body to another?"
Students attempt to make some responses.
Teacher elaborates -
"Circulatory system enables materials to be carried from one part of the body to another. The more complex an organism becomes, the more elaborate system of transport they require."
Teacher shows the meaning of the circulatory system through the transparency (Q).
Teacher asks students -
"What does circulation mean?"
Students respond.
Confirmation and/or corrective feedback are provided as and when required.
Teacher declares the next objective as follows:
"Next, we shall study about the types of blood vessels."

Teacher asks a student -
"If your hand is cut by a sharp weapon, like knife, what happens ?"
Student responds.
Teacher asks another student -
"Where is blood present in the body ?"
Teacher gives corrective feedback as follows -
"Blood in the body is present in vessels, known as the blood vessels, that carry blood from one part of the body to another."

Teacher asks a student -
"How many types of blood vessels are there ?"
Students attempt responses.
Teacher discusses -
"There are two types of blood vessels - arteries and veins. Arteries carry oxygen rich blood and veins carry carbon di-oxide rich blood. Just as in our house water pipes carry clean water and sewerage pipes carry dirty water."

Teacher asks students -
"What are blood vessels ?"
"How many types of blood vessels are there ?"
"What are veins ?"

"Which of the blood-vessels carry O_2 rich blood ?"

Teacher concludes the points discussed so far.

Content Sequences 4 & 5 (Oiv and Ov):
Teacher informs the class of the next objective -
"Next, we shall learn about the importance and function of heart in our body."

Teacher asks a student -
"When you have temperature, why does the doctor put his hand on your wrist?"
Student responds.

Teacher asks another student -
"How can a doctor know about the temperature by means of pulse?"
Students attempt partial responses.

Teacher explains -
"The doctor counts the pulse rate or the heart beat of a person as this helps him to know the number of times your heart beats in a minute, thus helping him to judge your body temperature."

Teacher asks one student to come near the table and asks him to place his hand below his breasts in order to feel the beating of something.
Teacher asks other students in the class also to feel their heart beat. Teacher indicates that this particular part of the body is known as the heart.
Teacher elaborates -
"Heart is the central organ of blood circulation. It beats constantly."

Teacher asks a student -
"What happens if heart of a person stops beating?"
Students attempt responses.

Teacher explains -
"A person will die if his heart stops beating."

Teacher asks a student -
"What are arteries?"
Student responds.
Teacher explains -
"Arteries carry O₂-rich blood from heart to various parts of the body."
Teacher asks a student -
"What are veins?"
Student responds,
Teacher explains -
"Veins carry blood rich in CO\textsubscript{2} from various body parts to heart".

Teacher projects a transparency of the diagram showing the heart, arteries and veins connected to one another.

Another transparency (Q) showing the meaning and function of heart, arteries and veins is shown to the students.

Teacher asks students -
"What is the function of heart?"
"How does blood circulation take place?"
Confirmation and/or corrective feedback are provided as and when the situation arises.

Teacher concludes the sub-topic as follows -
"We all respire, the colour of blood is the same in our bodies, we all need food to live so this is the proof that we are all same and that there is no difference between man and man as such. Although we may be practising different religions, God has made all persons the same".

Teacher observes that the students agree with the above explanation.

**CONTENT SEQUENCE 5 (Ovi)**:

Teacher informs the students of the next objective -
"Next, we shall study about transport system in unicellular animals."

Teacher asks students -
"Name some unicellular animals."
Students respond.

Teacher explains -
"In unicellular organisms like Amoeba, transport of materials, like water, O\textsubscript{2} takes place through the process known as cytoplasmic streaming. As the organism becomes complex, the need for elaborate system of transport arises."

Teacher shows a transparency (R) of amoeba, euglena and paramecium to the students.

Teacher asks student -
"How does transport system take place in amoeba?"
"Name some other unicellular animals in which cytoplasmic streaming takes place?"

Teacher provides confirmation/corrective feedback as and when required.
CONTENT SEQUENCE 6 and 7 (Ovii and Oviii):

Teacher puts forward the final objective of the lesson as follows -
"Lastly, we shall study conducting vessels and vascular bundle in plants."

Teacher asks students -
"What is photosynthesis ?"
"What are the factors necessary for photosynthesis ?"

Student responds.

Teacher exhibits transparency (0) of diagram of parts of a flowering plant.
"How does water travel from the roots to the leaves where photosynthesis takes place ?"
No response.

Teacher explains -
"There are some vessels that carry water and minerals absorbed by the roots of the
plants to various parts of the plant body. These vessels are known as the xylem vessels."

Teacher asks a student -
"How are the food materials produced by the leaves of a plant by photosynthesis,
carried to the different parts of the plant ?"
Students attempt partial responses.

Teacher explains -
"Food produced as a result of photosynthesis is carried from the leaves to various parts of the plant body by phloem vessels."

Teacher projects a transparency (0) of V.S. of leaf showing the xylem and phloem vessels.

Also, teacher shows a leaf of a Rose Plant to students indicating that the fine-network in the leaf is due to the xylem and phloem vessels.

Teacher also projects a transparency (Q) showing the meaning of xylem and phloem vessels. Students are asked to refer their hand-outs.

Teacher asks students -
"What are xylem vessels ?"
"What are phloem vessels ?"

Teacher explains -
"Together the xylem and phloem vessels form the vascular bundle "

Transparency (0) showing vascular bundle in V.S. of leaf is exhibited before the students. Also, another transparency (Q) showing the meaning of vascular bundle is projected before the students.
Teacher asks a student -
"What is a vascular bundle?"
Student responds.
Confirmation and/or corrective feedback are provided at every step of the discussion.

**FORMATIVE EVALUATION:**

1. Transport of materials from one part of the body to another takes place due to -
   a) circulation.
   b) digestion.
   c) respiration.

2. Arteries carry __________ (O\textsubscript{2}/CO\textsubscript{2}) rich blood.

3. Heart pumps blood to various parts of the body by __________ (veins/arteries).

4. Xylem are conducting vessels that carry __________ (food/water).

5. Vascular bundle is made up of xylem and phloem vessels both (True/False).

**HOME ASSIGNMENT**

1) Read the instructional material.
2) Draw diagram of circulatory system of man in your copy.
3) Read pages 136-138 from your Biology text-book from the Chapter, "Preservation of Self-1".
LESSON NO. 8

HAND-OUT

CIRCULATORY SYSTEM

It enables materials to be carried from one part of the body to another.

BLOOD VESSELS

They carry blood to and from various parts of the body.

ARTERIES

They are blood-vessels that carry oxygen-rich blood from heart to various body parts.

VEINS

They are blood vessels that carry carbon di-oxide rich blood from various body parts of the heart.

HEART

It is the central organ of blood circulation. Heart beats constantly.

RELATIONSHIP BETWEEN HEART AND BLOOD CIRCULATION

Heart pumps blood to all parts of the body by arteries and blood from various organs comes back to heart through veins.

CONDUCTING VESSELS IN PLANTS

They are of two types:

Xylem carries water and minerals absorbed by roots to various parts of the plant body.

Phloem carries food materials prepared by leaves to various parts of the plant.

VASCULAR BUNDLE

Together xylem and phloem form the vascular bundle.
LESSON NO 9

TOPIC: Parts of excretory system in man and excretory products of plants.

INSTRUCTIONAL OBJECTIVES:

After the instructions are over, learners have gone through the hand-outs, studied the enrichment and/or remedial material, they in their own words will be able to:

(i) state the meaning and function of excretory system of man.
(ii) enumerate the parts of the excretory system and explain their functions.
(iii) discriminate between the types of excretory products of plants.
(iv) explain the characteristics of excretory products of plants.

PRE-REQUISITE KNOWLEDGE OF STUDENTS:

It is assumed that students know the meaning and function of digestion, respiration, photosynthesis, filtration, the gases, CO₂ and O₂, stomata and blood.

REMEDIAL INSTRUCTION:

Doubts of the students will be learned on the basis of their performance in the formative evaluation. Students who made errors were given remedial instructions.

INSTRUCTIONAL AIDS:

1) Transparency (V) showing the diagram of excretory system of man
2) Transparency (I) showing the diagram of digestive system of man
3) Transparency (K) showing respiratory organs of man
4) Transparency (O) showing V.S. of leaf diagrammatically.
5) Transparency (U) showing the meaning and function of excretory system, parts of the excretory system and their functions.
6) Transparency (V) showing the meaning and types of excretory products of plants.
7) Overhead projector.

CONTENT SEQUENCE

1. Excretory System - helps the body to get rid of harmful waste products produced as a result of digestion of food and respiration.
2. **Parts of the Excretory System** -
   i) **Kidney** filters waste products from the blood.
   ii) **Ureter** carries urine from kidneys to the urinary bladder.
   iii) **Urinary bladder** - stores the urine.

3. **Excretory products of plants** -
   i) CO\(_2\) is the waste product of respiration. Partly, this CO\(_2\) is used for photosynthesis. Excess CO\(_2\) escapes through the stomata.
   ii) **Oxalate crystals and cystolith** - are the waste products stored inside the body of the plant after being transformed into harmless products.
   iii) In older plant cells, a large vacuole contains **excretory** products which remain inside the plant body for its whole life.
   iv) Some waste products collect in the bark and leaves of trees.

**INSTRUCTIONAL PROGRAM**

**CONTENT SEQUENCE 1 : (Oi)**

Teacher puts forward the first objective of the lesson as follows -
"Today, we shall study about the excretory system of man, i.e., system which enables us to get rid of waste matter from the body".

Teacher shows the transparency (I) of the diagram of the digestive system of man and asks students -
"What does this diagram remind you of ?"
"What is digestion ?"
"Is all the food we ingest absorbed by the body ?"
"What happens to the undigested part of the food ?"
"What is egestion ?"
Students make responses.

Teacher co-ordinates the above ideas as follows -
"Undigested part of the food is expelled or thrown out of the body by means of the excretory system. If waste products are allowed to accumulate inside the body, they can be harmful for the organism "

Next, the teacher shows a transparency (K) of respiratory organs of man and asks the students -
"Can you recall this diagram?"
"What is respiration?"
"How does the body get rid of CO$_2$ produced as a result of respiration?"
Students attempt responses.
Teacher elaborates -
"Exhaling enables us to get rid of CO$_2$"

Teacher shows the transparency (V) of the meaning of the excretory system and explains the same.

Teacher asks a student -
"What is excretion?"
Student responds.
Confirmation and/or corrective feedback are provided as and when needed.

CONTENT SEQUENCE 2: (Oii):

Teacher declares the next objective as follows -
"Next, we shall study about the parts of the excretory system."
Teacher asks students -
"What is excretion?"
"Name some waste products?"
Students attempt responses.
Teacher asks a student -
"Can anybody of you tell the parts of the excretory system of man?"
Students attempt to make partial responses.
Teacher shows a transparency (V) of the parts of the excretory system of man and explains -
"These are the kidneys, that are bean-shaped structures."
Teacher asks students -
"Can you tell me what is filtration?"
Student responds.
Teacher asks another student -
"What is urine?"
Partial response from students.
Teacher explains -
"Kidneys filter the waste products from the blood, leading to the production of urine".

Teacher points out the next two parts of the excretory system and describes:
"Urine is carried from the kidneys to a urinary bladder, a sac-like structure that stores urine. A tube-like structure called ureter carries the urine from the kidneys to the urinary bladder."

Transparency (V) showing functions of parts of excretory system is also projected before student.

Teacher asks students -
"What is the shape of kidneys?"
"Where is urine produced?"
"What is the function of ureter?"
"Where is urine stored?"

Students attempt responses.

Confirmation and/or corrective feedback are provided as and when the situation arises.

**CONTENT SEQUENCE 3 : (Oiii and Oiv) :**

Teacher puts forward the final objective of the lesson -
"Finally, we shall study about the excretory products of plants".

Teacher asks students -
"What is photosynthesis?"
"Name the factors essential for photosynthesis?"
"How does the plant get rid of CO\textsubscript{2}?"

Students make responses -

Teacher connects the above ideas as follows:
"CO\textsubscript{2}, a waste product of respiration of plants is used for photosynthesis and excess of CO\textsubscript{2} passes out through the stomata. So, leaves are the organs for respiration, photosynthesis and excretion in plants."

Teacher asks another student -
"What is bark?"
Student responds.

Teacher asks a student -
"Why do leaves fall?"
Student attempts to make partial responses
Teacher explains -
"Some waste products of plants get collected in the bark of trees and leaves of plants. These are got rid of when trees shed their leaves and bark."

Teacher asks a student -
"Can you name some more waste products in plants?"
No response from students.

Teacher explains -
"There are two other waste products of plants, oxalate crystals and cystolith. These waste products are transformed into harmless products and stored inside the plant body."

Teacher asks a student -
"What is a vacuole?"
No response from students.

Teacher explains -
"In older plant cells, a large vacuole contains excretory products which remain inside the plant body for its whole life."

Teacher projects a transparency (V) of the meaning of different excretory products in plants.
Teacher asks a student -
"What happens to the CO$_2$, a waste product of respiration in plants?"
"Name some waste products of plants?"
"What is a vacuole?"
Students respond.
Confirmation and/or corrective feedback are provided as and when needed.
FORMATIVE EVALUATION

1. Excretory system enables plants and animals to get rid of ________________ (harmless/harmful) products.

2. Ureter carries ________________ (blood/urine) from kidneys to the urinary bladder.

Tick mark (✔️) the one you think is correct in the following questions:

3. Urine is stored in -
   a) Kidneys.
   b) Urinary bladder
   c) Ureter.

4. CO₂ in plants is produced as a result of -
   a) photosynthesis.
   b) transportation.
   c) respiration.

5. Tick mark (✔️) against the excretory products of plants:
   a) Urine.
   b) Oxalate crystals.
   c) Cystolith.
   d) Carbon dioxide.

HOME ASSIGNMENT:

2. Read the instructional material.
3. Read pages 138-139 in your text-book from the chapter, "Preservation of Self - 1".
LESSON NO 9

HAND-OUT

EXCRETORY SYSTEM

It helps the body to get rid of harmful waste products produced as a result of digestion of food and respiration.

PARTS OF EXCRETORY SYSTEM

i) **Kidney** - filters waste products from the blood.

ii) **Ureter** - carries urine from kidneys to the urinary bladder.

iii) **Urinary bladder** - stores the urine.

EXCRETORY PRODUCTS OF PLANTS

i) **CO₂** is the waste product of respiration.

ii) **Oxalate crystals and cystolith** are waste products stored inside the plant body after being transformed into harmless products.

iii) In older plant cells, a large vacuole contains excretory products which remain inside the body of the plant for its whole life.

iv) Some waste products accumulate in the bark and leaves of trees.
TOPIC: Movement in plants and animals

INSTRUCTIONAL OBJECTIVES:
After the instructions are over, learners have gone through the hand-outs, studied the enrichment and/or remedial material, they in their own words will be able to -
(i) state the meaning of movement.
(ii) describe the meaning of locomotion.
(iii) discriminate between locomotion and movement.
(iv) state the meaning of movement of curvature.
(v) discriminate movement of different types in plants.
(vi) state the meaning of locomotory organs.
(vii) distinguish between the types of locomotory organs in animals

PRE-REQUISITE KNOWLEDGE OF STUDENTS:
It is assumed that the students know the types of movement shown by different animals like a butterfly flies, a horse runs, a fish swims, snake crawls and a man walks, and the difference between unicellular and multicellular animals, and about photosynthesis.

REMEDIAL INSTRUCTION:
Doubts of the students were cleared on the basis of their performance in the formative evaluation. Students who made no errors were directed to the enrichment material.

INSTRUCTIONAL AIDS:
i) Transparency (S) showing movement in different animals.
ii) Transparency (R) showing movement of curvature.
iii) Transparency (T) showing meanings of movement, locomotion, movement of curvature examples of movement in plants and types of locomotory organs in animals.
iv) Transparency (R) showing unicellular animals, euglena, amoeba and paramecium.
v) Overhead projector
1. **Movement** is the displacement of an object from one place to another. Animals move from place to place in search of food, shelter, mate, and to escape from the enemy.

2. **Locomotion** is the type of movement when an organism moves from place to place.

3. **Movement of Curvature** when a part of the body moves with reference to its body axis.

4. **Movement in plants** - Usually plants remain fixed to the ground. But, movement is shown by them too as in the following instances:
   a) Twigs bend towards light.
   b) Opening and closing of flower buds.
   c) Creepers coil around a support.
   d) Mimosa plant droops on touch.
   e) Folding of leaves of some leguminous plants.
   f) Young plants reach out for light.
   g) Roots always grow towards the ground.

5. **Types of Locomotory Organs in Animals**:
   Locomotory organs help in locomotion.
   - **Euglena** moves by whip-like action of flagella, that is long and thread-like.
   - **Paramecium** moves by cilia, that are small and hair-like.
   - **Earthworm** moves by the contraction and relaxation of body muscles and some spine-like structures, called setae.
   In higher animals, movement occurs due to the contraction and relaxation of the body muscles.

**INSTRUCTIONAL PROGRAM**

**CONTENT SEQUENCE I, 2 and 3 (i, ii & iii):**

"Firstly, we shall learn about movement in animals."
Teacher asks students projecting transparency (S) -
"How does a butterfly move?"
"How does a horse move?"
"How does a fish move?"
"How does a snake move?"
"How does a man move?"
Students make responses.
Teacher co-ordinates the above ideas as follows -
"Movement is the displacement of an object from one place to another."
Teacher asks a student -
"Why do animals move from place to place?"
Student responds partially.
Teacher elaborates as follows -
"Animals move from place to place in search of food, shelter, mate and to escape from the enemy."
Teacher asks another student -
"What is locomotion?"
Students respond partially.
Teacher explains -
"Locomotion is that particular type of movement when an organism moves from place to place."
Teacher shows the meaning of locomotion through the transparency (T).
Teacher asks students -
"What is movement?"
"What is locomotion?"
Students respond.
Confirmation and/or corrective feedback are provided as and when the situation arises.

**CONTENT SEQUENCE 3 (0iv):**

Teacher tells the class -
"Next, we shall learn about the movement of curvature."
Teacher asks a student -
"What is movement?"
Student responds.
Teacher asks another student -
"What is movement of curvature?"
Teacher corrects the student responses, uses them and presents the explanation as follows -
"When one part of the body moves with reference to the entire body, the process is known as movement of curvature."

A transparency (R) showing a diagrammatic representation of movement of curvature is projected before the students. In addition to this, the teacher demonstrates movement of curvature before the students and supplements with meaning through transparency (T).

Teacher asks a student -
"What is movement of curvature?"

Students respond.

Confirmation and/or corrective feedback are provided as and when the situation demands.

CONTENT SEQUENCE 4 (Ov):

Teacher declares the next objective as follows -
"Now, we shall learn about the different types of movement shown by plants."

Teacher asks a student -
"Have you seen a plant move?"

Student responds.

Teacher tells the class -
"Although plants remain fixed to the ground, they do show movement."

Teacher tells the class -
"Now we shall discuss some examples of movement shown by plants."

Teacher asks a student -
"Is sunlight essential for photosynthesis?"

Student responds.

Teacher asks -
"Why do you think twigs move towards light?"

No response.

Teacher explains -
"As sunlight is essential for photosynthesis hence twigs move towards light."

Teacher asks a student -
"Have you seen a flower bud closing and opening?"

Students respond.

Teacher relates the above response as follows -
"Flower buds open and close showing movement."

Teacher asks a student -
"Have you seen a creeper?"

Student responds.
Teacher asks a student -
"Have you seen creepers coiling around trees ?"
Student responds.
Teacher explains -
"Creepers coiling around a support is showing movement."
Teacher asks a student -
"Have you seen a plant known as "Touch-me-not"?
Student responds.
Teacher asks another student -
"Why does touch-me-not, or the Mimosa plant, droop down on touch ?"
No response.
Teacher explains -
"Mimosa plant droops on touch showing movement."
Teacher asks a student -
"What part of a plant is below the ground ?"
Student responds.
Teacher co-ordinates and states -
"Roots always grow towards the ground."
Transparency (T) showing the different types of movement is projected on the OHP.
Teacher asks students -
"Give some examples of movement shown by plants ?"
Confirmation and/or corrective feedback are provided at every stage of the discussion.

CONTENT SEQUENCE 5 (Ovi and Ovii) :
Teacher tells the class -
"Finally, we shall today study about the type of locomotory organs in animals".
Teacher asks a student -
"What are unicellular animals ?"
Student responds.
Teacher asks another student -
"What are multicellular animals ?"
Student responds.
Teacher asks students to give some examples of unicellular and multicellular animals
Teacher concludes -
"Euglena, paramecium are other examples of unicellular animals."
Teacher projects a transparency (R) of Euglena and explains -
"Euglena moves by the whip-like action of flagella, which is long and thread-like."
Next, diagram of paramecium is projected through the transparency (R) and explanation given as follows -
"Paramecium moves by cilia, that are small and hair-like structures."
Teacher asks a student -
"Have you seen an earthworm?"
Student responds.
Teacher asks another student -
"Have you seen an earthworm move?"
Students respond.
Teacher asks a student -
"How does an earthworm move?"
Students make partial responses.
Teacher explains -
"Earthworm moves by the relaxation and contraction of body muscles. Also, setae, fine, spine-like structures help in the movement of earthworm."
Teacher projects transparency (T) showing written description of locomotory organs in animals
Teacher asks a student -
"How do higher animals move?"
Partial response made by students.
Teacher explains -
"Higher animals and man move due to the contraction and relaxation of the body muscles."
Teacher asks students -
"How does a euglena move?"
"Name the locomotory organ of paramecium?"
"What are setae?"
Students make responses.
Confirmation and/or corrective feedback are provided at all stages of discussion.

**FORMATIVE EVALUATION:**

1] When an organism is displaced from one place to another, it is known as movement of curvature (True/False).
2) Flagella are locomotory organs of ________________(euglena/paramecium).
3) Setae are the locomotory organs of ________________(earthworm/amoeba).
4) Plants show movement (True/False).
5) Point out the examples of movement in plants:
   a) Opening and closing of flower buds.
   b) Leaves make their food.
   c) Creepers coil around a support.

**HOME ASSIGNMENT:**

1) Draw the diagrams of euglena, paramecium and earthworm in your note-book.
2) Read the instructional material.
3) Read pages 143-145 in your text-book from the chapter, "Preservation of Self - 2".
TOPIC: Nervous System of man

INSTRUCTIONAL OBJECTIVES:

After the instructions are over, learners have gone through the hand-outs, studied the enrichment and/or remedial materials, they in their own words, with the help of paper and pencil will be able to:

(i) explain the meaning and function of sense organs.
(ii) state the meaning and function of nerve cells.
(iii) explain the function of brain.
(iv) discriminate between effector and receptor organs.
(v) distinguish between voluntary and involuntary actions.

PRE-REQUISITE KNOWLEDGE OF STUDENTS:

It is assumed that students know the function of eyes, ears, nose, skin and tongue. Also they know the meaning of heart beat and enzymes.

REMEDIAL INSTRUCTIONS:

Doubts of the students were clarified on the basis of their performance in the formative evaluation. Students who made errors were asked to read the remedial materials.

INSTRUCTIONAL AIDS:

1) Transparency (W) showing the various system of man diagrammatically
2) Transparency (W) showing the diagram of a nerve cell.
3) Transparency (X) showing the meaning and functions of sense organs and nerve cells.
4) Transparency (X) showing the function of brain and functions of receptor and effector organs and the meaning of voluntary and involuntary actions
5) Overhead projector.

CONTENT SEQUENCE

1. Sense Organs - are organs that receive sensation from the outside world and communicate it to the brain.
   Eye receives sensation in the form of light.
Ear receives sensation in the form of sound.
Nose receives sensation in the form of smell.
Tongue receives sensation in the form of chemicals.
Skin receives message in the form of temperature and pressure.

2. Nerve Cells - are special types of cells that help an individual to be aware of his environment.

3. Brain - is the important organ in the nervous system of man. Brain acts as the decision making centre. Brain receives message from the sense organs through the nerve cells and sends out instructions, through another set of nerve cells for the body to act accordingly. Man has a highly evolved brain.

4. Receptor and Effector Organs -
Receptor organs are organs that receive sensation from outside and communicate it to the brain. Eye, Ear, Nose, Skin and Tongue are the receptor organs.

Effector organs are organs that carry instructions from the brain.
Muscles, bones, glands are the effector organs.

5. Voluntary and Involuntary Actions -
Voluntary actions are actions controlled by a person's will. Walking, running, lifting are the voluntary actions.
Involuntary actions are actions not controlled by a person's will. Beating of heart, secretion of digestive juices are involuntary actions.

INSTRUCTIONAL PROGRAM

CONTENT SEQUENCE I (Oi) :

Teacher declares the first objective of the lesson as follows:
"First of all, we shall study about the meaning and function of the sense organs."

Teacher asks students -
"Name some organs of the body ?"
"What is the function of eyes ?"
"How does the eye receive message from the environment ?"
Students attempt responses.
Teacher explains -
"Eyes receive message in the form of light. In the absence of light, we will be unable to see anything"
Teacher asks students -
"What is the function of ears?"
"How do the ears receive message from the outside world?"
Students make responses.
Teacher describes -
"Ears receive message in the form of sound".
Teacher asks students -
"What is the function of nose?"
"How does the nose receive message?"
Students respond.
Teacher provides corrective feedback and presents an explanation as follows -
"Nose receives message in the form of smell."
Teacher asks students -
"What is the function of tongue?"
"What are chemicals?"
"How does the tongue receive message?"
Students attempt responses.
Teacher co-ordinates the above ideas and explains -
"Tongue receives message in the form of chemicals, i.e. sweet, salty, sour, etc."
Teacher asks students -
"What is temperature?"
"What is pressure?"
"What is the function of skin?"
"How does the skin receive message?"
Students attempt responses.
Teacher explains after connecting the above ideas -
"Skin receives message in the form of temperature and pressure."
Teacher asks a student -
"What are these organs called that we have just now studied about?"
Partial response from students.
Teacher explains -
"The organs that receive sensation from the outside world and communicate it to the brain are called the sense organs. Eye, Ear, Nose, Skin and Tongue are the five sense organs in our body."

Transparency (X) showing the meaning and functions of different sense organs is projected before the students.

Teacher asks students -
"How many sense organs are there in our body?"
"Which of the sense organs receive temperature and pressures?"
"How does the tongue receive sensations from the environment?"
"What is the function of the sense organ nose?"

Students respond.

Teacher provides confirmation and/or corrective feedback at every stage of the discussion.

CONTENT SEQUENCE 2 (0ii)

Teacher tells the class -
"Next, we shall study about the nerve cells."

Teacher asks a student -
"When we touch something hot, what happens?"

Student responds.

Teacher asks another student -
"What leads to this movement of the hand?"

Partial response by students.

Teacher explains -
"There are special types of cells that enable us to be aware of our environment. These cells are known as the nerve cells."

Teacher exhibits the transparency (W) of diagrammatic representation of nerve cells and also the meaning of nerve cells through the OHP transparency (X).

Teacher asks student -
"How are nerve cells different from the body cells?"

Students make responses.

Confirmation and/or corrective feedback are provided to each response.
CONTENT SEQUENCE 3 (Oiii):

Teacher declares the next objective as follows -
"Next, we shall study about a very important organ of our body, the brain."

Teacher asks a student -
"Can you name some processes of our body ?"
Student responds.
Teacher asks another student -
"Which organ of our body controls all the processes of our body ?"
Student attempts responses.
Teacher provides corrective feedback and explains —
"Brain acts as a centre for making various decisions regarding the body processes.
Brain is the important organ of the nervous system of man."
Teacher asks a student -
"Do all animals have a nervous system ?"
Students gives partial responses
Teacher clarifies as follows -
"All animals have a nervous centre, but the brain of man is highly evolved and most
developed."
Teacher asks students -
"What are sense organs ?"
"Name some sense organs ?"
"Who sends instructions to the sense organs to act accordingly ?"
Students attempt responses.
Teacher explains -
"Brain receives message through the nerve cells from the sense organs. Then, the
brain sends instructions to the sense organs to act in accordance."
Teacher projects a transparency (W) of the diagram of nervous system of man and
also the function of brain is shown to the students through the OHP transparency(X).

Teacher asks students -
"What is brain ?"
"What is the function of brain ?"
Students attempt responses.
Students responses are corrected and used to develop the full concept and function
of brain.
CONTENT SEQUENCE 4 (Oiv) :-

Teacher informs the class of the next objective -
"After learning about brain, we shall distinguish between the receptor and effector organs".

Teacher asks students -

"How many sense organs are there ?"
"What is the function of sense organs ?"
"What are receptor organs ?"

Students attempt responses.
Teacher elaborates the above idea as follows -
"Receptor organs are organs that receive sensation from the outside world and communicate it to the brain. All the sense organs, i.e. eye, ear, nose, skin and tongue are the receptor organs."

Transparency (X) of the meaning of receptor organs is shown and discussed with the students.

Teacher asks a student -
"Do you know the organs that carry instructions from the brain ?"

No response from students.
Teacher describes -
"Organs that carry the instructions from the brain to the sense organs are called the effector organs.
Examples are, muscles, bones and glands."

Teacher exhibits a transparency (X) of meaning of receptor organs before the students.
Teacher asks students -
"What are receptor organs ?"
"Give examples of effector organs ?"

Students respond

Teacher provides corrective feedback and makes use of those responses to develop the conclusion

CONTENT SEQUENCE 5 (Ov) :-

Teacher informs the class of the final objective as follows -
"Finally we shall discuss the differences between voluntary and involuntary actions of our body".
Teacher asks a student -
"Name some actions ?"
Student responds.
Teacher asks another student -
"Can we walk, run, or lift something whenever we feel like ?"
Student responds.
Teacher co-ordinates the above responses and explain -
"Actions that are controlled by our own wish are called the voluntary actions."
Teacher asks a student -
"Why does our heart beat ?"
"Is heart beat under our control ?"
"Can we stop our heart from beating whenever we want ?"
Students make responses.
Teacher co-ordinates the above ideas and explains -
"Heart beat is also an action of our body, but, it's not under our control, so it is an example of involuntary action".
Teacher asks another student -
"What is digestion ?"
"How is digestion speeded up ?"
"What are enzymes ?"
"Is the secretion of enzymes under our control ?"
Students respond.
Teacher elaborates the above idea and explains -
"Secretion of digestive juices or enzymes is also an involuntary action. Therefore, actions not under our control are known as the involuntary actions".
Transparency (X) of the types of actions is projected through the OHP.

Teacher asks students -
"What are voluntary actions ?"
"Give examples of involuntary actions ?"
Students respond.
Teacher provides corrective feedback and concludes the points discussed.

**FORMATIVE EVALUATION**

1. Light is received by which of the sense organs ?
a) Eye
b) Ear.
c) Nose.

2 Skin receives message in the form of -
   a) sound.
   b) temperature and pressure.
   c) chemicals.

3. How many sense organs are there in body of man?
   a) 4
   b) 5
   c) 6

4. Nerve cells help us to be aware of the world around us (True/False).

5 Brain is an important organ of the -
   a) nervous system
   b) respiration
   c) digestion

6 Effector organs are -
   a) Eyes.
   b) Ears.
   c) Bones

7 Point out the involuntary actions:
   a) Walking.
   b) Beating of the heart.
   c) Running.

HOME ASSIGNMENT:
1) Read the instructional material.
2) Read pages 147-148 in your text-book from the chapter, "Preservation of Self - 2"
NERVE CELLS

They are special types of cells that enable us to become aware of our environment.

SENSE ORGANS

They are organs which receive sensation from the outside world and communicate it to the brain.

Eye receives message in the form of light.
Ear receives message in the form of sound.
Nose receives message in the form of smell.
Tongue receives message in the form of chemicals.

BRAIN

It is the important organ in the nervous system of man. Brain acts as a decision-making centre. Brain of man is highly evolved.

RECEPTOR ORGANS

They are organs that receive sensation from outside and communicate it to the brain.

EFFECTOR ORGANS

They are organs that carry instructions from the brain.

VOLUNTARY ACTIONS

These are actions that are controlled by a person's will.

INVolUNTARY ACTIONS

These are actions not controlled by a person's will.
LESSON NO.12

TOPIC: Endocrine system in man, types of endocrine glands and growth hormones in plants.

INSTRUCTIONAL OBJECTIVES:

After the instructions are over, learners have gone through the handouts, studied the enrichment and/or remedial material students in their own words will be able to -

(i) state the meaning and functions of endocrine glands.
(ii) explain the meaning and types of hormones.
(iii) outline the types of endocrine glands.
(iv) identify the causes of the disease, diabetes.
(v) identify the cause of the disease, goitre.
(vi) identify the location of endocrine glands in the body.
(vii) explain the meaning of growth hormones in plants.
(viii) relate movement and growth hormones in plants.
(ix) explain the importance of studying various body processes.

PRE-REQUISITE KNOWLEDGE OF STUDENTS:

It is assumed that the learners know the parts of the digestive and the excretory systems and also about diabetes, a common disease.

REMEDIAL INSTRUCTION:

Students' doubts as revealed by their performance in the formative evaluation will be removed. Students who made errors will be given remedial instructions.

INSTRUCTIONAL AIDS:

1. Transparency (V) of the diagram of excretory system of man.
2. Transparency (I) of the diagram of digestive system of man.
3. Transparency (V) of the diagram showing the location of endocrine glands of man.
4. Transparency (Y) showing the meaning of endocrine glands, names of endocrine glands and the meaning of growth hormones with examples.
1. **Endocrine glands** - are glands that secrete special chemicals, called hormones in their blood. They are the ductless glands, and control growth and functions of the body and help in the co-ordination of body activities.

2. Perenial gland, pituitary gland, thyroid gland, **pancreas**, ovary and testis are some of the endocrine glands.

   **Pituitary gland** also known as the master gland, controls growth and the functions of other endocrine glands.

   **Adrenal gland** is a gland situated at the top of kidneys. It secretes a hormone known as adrenalin, when a person is agitated or frightened.

   **Pancreas** is a gland which secretes insulin that controls the amount of sugar present in the blood. Non-co-ordination of insulin causes diabetes.

   **Thyroid gland** is an endocrine gland, the non-co-ordination of which leads to goitre, swelling in the neck.

3. **Growth Hormones** - are special hormones present in plants that bring about movement like,
   a) Ripening of fruit.
   b) Falling of leaves.
   c) Flowering.

4. Understanding of body processes for the proper functioning of the body and helps an individual to understand the body mechanism.

**INSTRUCTIONAL PROGRAM**

**CONTENT SEQUENCE I (Oi and Oii)**:

Teacher declares the first objective of the lesson as follows -
"First of all, we shall study about the meaning and function of endocrine glands..."
Teacher asks students -
"What is the function of nervous system in our body ?"
"Which organ controls the various body activities ?"
"Do you know we also have chemical control in our body ?"
"Can you tell me how are chemicals secreted in our body ?"
Students attempt responses.
Teacher co-ordinates the above ideas and explains -
"Chemicals, called the hormones are secreted in the blood by some glands "
Teacher asks students -
"What are glands ?"
Students attempt responses.
Teacher explains -
"Glands are organs of our body that secrete juices." 
Teacher asks another student -
"Can you tell the name of the glands that secrete hormones ?"
Students make no response.
Teacher explains -
"Glands that secrete hormones are called the ductless glands or the endocrine glands.
Their secretions i.e., the hormones bring about co-ordination between the various body activities."

Teacher projects transparency (Y) of the meaning and function of the endocrine glands to the students and explain the same to them.
Teacher asks -
"What are endocrine glands ?"
"What do they secrete ?"
Students respond.
Teacher provides corrective feedback and outlines the conclusion -
"Thus, we see that our body activities are controlled by the nervous and the endocrine systems."

CONTENT SEQUENCE 2 (Oiii, Oiv and Ov and Ovi) :

Teacher informs the class of the next objective -
"Next, we shall study about the types and functions of endocrine glands."
Teacher asks students -
"What are endocrine glands ?"
"What are hormones ?"
Students respond.
Teacher explains with the help of a transparency (V) of the diagram of endocrine glands in the body of man and a woman -
"Endocrine glands in the body of man and woman are perennial gland, pitutary gland, thyroid gland, pancreas, ovary/testis."
Teacher asks a student -
"Which endocrine gland is known as the "master gland" in our body. ?"
Students make no response.
Teacher describes -
"Pituitary gland controls the growth and functions of all other endocrine glands in our body."
Teacher projects the transparency (V) of the diagram of excretory system of man and asks -
"Name the parts of the excretory system of man ?"
Student responds.
Teacher asks another student -
"Can you see the cap-like structure on the kidney ?"
Student responds.
Teacher explains -
"These are the adrenal glands that are situated on the top of the kidneys."
Teacher asks students -
"What happens when a person is agitated or frightened ?"
"What causes faster heart beat and sweating ?"
Students attempt responses partially.
Teacher explains -
"When a person is agitated or frightened, a hormone is secreted by the adrenal gland, called, adrenalin."
Teacher asks students -
"Do you know what is diabetes ?"
"Why are diabetic people asked not to consume sugar ?"
Partial responses are obtained from students.
Teacher describes -
"Diabetes is a disease when more than the normal amount of sugar is present in the blood. If a diabetic patient eats sugar, the proportion of sugar in the blood will rise leading to high blood pressure, which in turn leads to heart attack."
Teacher asks a student: "What controls the amount of sugar that passes into the urine?"
No response from students.
Teacher projects a transparency (I) of the diagram of digestive system of man and explains:
"This leaf like structure is the pancreas, an endocrine gland, that secretes a hormone called insulin, that controls the amount of sugar that passes into the urine."
Transparency (Y) of the functions of adrenal gland, pancreas, and pituitary gland is shown to the students.
Teacher asks students: "Have you seen people with the swollen necks, especially those from hilly areas?"
"What is goitre?"
Students respond.
Teacher explains: "Goitre is a disease common in people from the hilly areas caused due to lack of iodine. That is why, people must have iodized salt. This disease is caused due to the non-co-ordination of thyroid gland."
Teacher asks students: "What is the function of adrenal gland?"
"What is the function of insulin?"
"What causes goitre?"
"Name some endocrine glands?"
Students make responses.
Teacher provides confirmation and/or corrective feedback at every stage of the discussion.

CONTENT SEQUENCE 3 (Ovii and Oviii):

Teacher puts forward the next objective of the lesson as follows: "Finally, we shall study about the growth hormones in plants."
Teacher asks students -
"What is growth ?"
"What brings about growth in plants ?"
Partial responses from the students.
Teacher elaborates as follows -
"Growth in plants is brought about by certain hormones, called the growth hormones."
Teacher asks a student -
"Can you tell some other functions of growth hormones ?"
No response from students.
Teacher explains -
"Movement in plants is brought about by growth hormones, like, flowering, ripening of fruit, falling of leaves".
Teacher projects the transparency (Y) of the meaning of growth hormones and examples of movement caused by growth hormones in plants.
Teacher asks -
"What are growth hormones ?"
"Give some examples of movement caused by the growth hormones ?"
Students make responses.
Teacher provides confirmation and/or corrective feedback at every stage of the discussion.
Teacher concludes -
"As in the society, if every member behaves as he/she wishes, there will be chaos, similarly, in our body control and co-ordination is essential so that the body of an organism functions properly."

**CONTENT SEQUENCE: 4 (Oix) :**

Teacher informs the class of the final objective -
"Lastly, we shall study about importance of studying various body processes."
Teacher asks students -
"Which body process helps us to utilize the food we eat ?"
"Which process of the body gives us energy-rich molecules ?"
"Which process of the body helps us to be aware of our environment ?"
"By which body process do we get rid of waste matter ?"
"How is O₂ transported from one part of the body to another ?"
"How does our body get chemically co-ordinated ?"
Teacher asks a student -
"What is the importance of studying various body processes?"
satisfactory answer is obtained from the students.
Teacher elaborates -
Digestion, respiration, circulation, growth, excretion, movement, nervous and chemical coordination are various basic body processes that are universal in all men and women. For the proper functioning and understanding of our body mechanism, it is desired fit that we understand this fundamental unity. It also helps us to have better health habits, so that we have better health."
Teacher asks students -
"How can we have better health habits?"
"How does understanding of body processes help us?"
Teacher provides confirmation and/or corrective feedback at every step of the discussion.

**Formative Evaluation:**

1. Hormones are secreted by -
   a) digestive glands.
   b) endocrine glands.

2. Growth is controlled by endocrine glands (True/false).

3. Adrenalin is secreted by -
   a) pancreas.
   b) thyroid gland.
   c) None of these.

4. Diabetes is caused due to the non co-ordination of ___________________ (insulin/adrenalin).

5. Movement in plants is brought about by the growth hormones (True/False).

**Home Assignment:**

1. Read the instructional material.
2. Read page 149 from your text-book from the chapter, "Preservation of Self - 2."
LESSON NO. 12

HAND-OUT

ENDOCRINE GLANDS

These are glands that secrete special chemicals called hormones in the blood. These are ductless glands and control growth and functions of the body.

ADRENAL GLAND

It is a gland situated at the top of kidneys. It secretes a hormone known as adrenalin.

PANCREAS

It is a gland that secretes the hormone, insulin, which controls the amount of sugar that is passed into the urine. Diabetes is caused due to the non coordination of insulin.

GROWTH HORMONES

These are special hormones that are present in plants that bring about movement.

Examples of movement brought about by growth hormones -
1) Ripening of fruit.
2) Falling of leaves
3) Flowering.
TRANSPARENCY 'A'

DEFINITION OF CHANGE
Change is the process of variation in a living object.

DEFINITION OF GROWTH
Growth is the process of increase by assimilation.

DEFINITION OF DECAY
Decay is the process of deterioration gradually with use in living and non-living objects.

PLANT-EATERS
Animals that eat plants, like, grass, shrubs are called plant-eaters.

FLESH-EATERS
Animals that eat flesh of other animals are called flesh-eaters.

FOOD CHAIN

In a food chain, one organism form the source of food for another organism, which eventually leads to the restoration of raw materials to the earth.

RICE → MICE → MONGOOSE
Different stages in the growth of a plant.

Different stages in the growth of man.

TRANSPARENCY 'B'
Food habits of animals. Like man, the monkey (6) uses its forelimbs. The cow (1), the horse (5), the donkey (7), and the goat (4) are vegetarian and they use their mouths directly. Lion (3) is meat-eater; it has sharp pointed teeth to tear flesh. Pigeons (2) use their beaks for picking up grains.
FOOD CHAIN

FLESH EATERS

PLANT EATERS

PRODUCERS

Food pyramid.

FOOD CHAIN

RAW MATERIALS → PLANTS → INSECT → FROG → SNAKE

Food chain
MOUTH PARTS OF MOSQUITO.
(a) Some animals eat plants:

(b) Some animals eat other animals which eat plants:

(c) Some animals eat other animals which eat still other animals which in turn eat plants.

(d) Some animals eat both plants and animals.
CHLOROPHYLL

Chlorophyll is a chemical substance present in leaves of plants. Green plants are green due to the presence of chlorophyll.

PHOTOSYNTHESIS

Photosynthesis is a complex process that enables plants to prepare their food. It takes place in the leaves of plants.

STEPS OF PHOTOSYNTHESIS

STEP 1: Energy of sunlight is trapped by plants.

STEP 2: In the presence of water and CO₂ of air, food in the form of carbohydrates is produced. O₂ is produced as a by-product.

INSECTIVOROUS PLANTS

They are plants that are specially modified to capture insects and small animals.

Examples:

1. Pitcher plant.
2. Bladder wort.

PRIMARY PRODUCERS

Green plants form the first source of food in every community as they can make their own food from simple raw materials.

PRIMARY CONSUMERS

They are animals that feed upon plants.

SECONDARY CONSUMERS

They are animals that feed upon plant-eaters or the primary consumers for their food.

DECOMPOSERS

They are organisms that feed upon dead or decaying plants or animal bodies and return back the raw materials of the earth.
TRANSPARENCY 'H'

INGESTION
It is the process of taking food inside the body.

DIGESTION
It is the process of breaking down of ingested food into simpler constituents.

ABSORPTION
It is the process of absorbing food inside the body. It is sucking in of food by the blood vessels from the walls of the intestine.

EGESTION
It is the process of throwing out the undigested part of the food outside the body.

DIGESTIVE SYSTEM
It is constituted of various organs as follows:

1. Oesophagus.
2. Stomach.
3. Liver.
4. Small Intestine.
5. Large Intestine.
6. Appendix.
7. Rectum.
Diagram to illustrate the Absorption of Food.
INSECTIVOROUS PLANT

The Human Alimentary System, in situ. The contents of the thoracic cavity are also shown.
Respiratory Organs of Man

- Nasal Passage
- Trachea (Wind Pipe)
- Lung
- Diaphragm

The path of air inside lungs.

Inhale

Exhale

Exhaled air turns lime-water milky.
NUTRIENTS

They provide nourishment to the body for performing various functions.

TYPES OF NUTRIENTS

1) CARBOHYDRATES - used for obtaining energy.
2) Fats - used for obtaining energy.
3) PROTEINS - used for growth of the body

RESPIRATION

It is the process by which complex food is broken into carbon dioxide and water leading to the release of energy-rich packets for body functions.

BREATHING

It is taking in and expelling out of air from the mouth and nose.  
Inhaling is breathing in $O_2$ from the air.  
Exhaling is breathing out of $CO_2$.

ENZYMES

Enzymes are chemical agents, that speed up a chemical reaction and are specific in their action.
**GILLS**

Gills are the respiratory organs of fish. They are comb-like and deep-red in colour present on each side of the head. Gills are covered by a hard movable plate, called operculum.

**STEPS IN RESPIRATION OF FISH**

Water enters through the mouth, bathes the gills and passes out through the opening of the operculum. Blood present in gills takes in oxygen dissolved in water and gives out CO$_2$.

**TRACHEA**

Trachea are the respiratory organs of insects. They have paired openings in several body segments which open to the outside and within into a network of trachea. Here, gaseous exchange takes place between the body cells and outside air.

**STOMATA**

Stomata are the respiratory organs of plants. They are openings present on the lower surface of the leaf and here gaseous exchange takes place.

**RESPIRATORY ORGANS**

These are organs that help animals and plants to perform respiration which is necessary for life. They bring about exchange of gases (O$_2$ & CO$_2$) inside the body.

**LUNGS**

Lungs are the respiratory organs of man. Exchange of gases takes place in the surface of the lungs, that are richly supplied with blood vessels.
Diagram to show the structure of a flowering plant.

Transverse Section of a foliage leaf, passing through the mid-rib
Circulatory system of man. Red coloured vessels are arteries. Vessels shown in black are called veins.
TRANSPARENCY 'Q'

CIRCULATORY SYSTEM

It enables materials to be carried from one part of the body to another.

BLOOD VESSELS

They carry blood to and from various parts of the body.

ARTERIES

They are blood-vessels that carry oxygen-rich blood from heart to various body parts.

VEINS

They are blood vessels that carry carbon di-oxide rich blood from various body parts to the heart.

HEART

It is the central organ of blood circulation. Heart beats constantly.

RELATIONSHIP BETWEEN HEART AND BLOOD CIRCULATION

Heart pumps blood to all parts of the body by arteries and blood from various organs comes back to heart through veins.

CONDUCTING VESSELS IN PLANTS

They are of two types:

Xylem carries water and minerals absorbed by roots to various parts of the plant body

PHLOEM carries food materials prepared by leaves to various parts of the plant.

VASCULAR BUNDLE

Together xylem and phloem form the vascular bundle.
Common microscopic animals in stagnant water.

Action of muscles in the movement of arms.

Movement of curvature.
**TRANSPARENCY 'T'

**MOVEMENT**

It is the displacement of an object from one place to another.

**LOCOMOTION**

It is the type of movement when an organism moves from place to place.

**MOVEMENT OF CURVATURE**

When a part of the body moves with reference to its body axis.

**MOVEMENT IN PLANTS**

a) Twigs bend towards light.
b) Opening and closing of flower buds.
c) Creepers coil around a support.
d) Folding of leaves of leguminous plants.
e) Mimosa plant droops on touch.
f) Young plants reach for light.
g) Roots grow towards the ground.

**LOCOMOTORY ORGANS IN ANIMALS**

a) *Euglena* moves by whip-like action of flagella, that is long and thread-like.
b) *Paramecium* moves by cilia, that are small and hair-like structures.
c) *Earthworm* moves by contraction and relaxation of body muscles and some spine-like structures, called setae.
It helps the body to get rid of harmful waste products produced as a result of digestion of food and respiration.

**PARTS OF EXCRETORY SYSTEM**

i) **Kidney** - filters waste products from the blood.
ii) **Ureter** - carries urine from kidneys to the urinary bladder.
iii) **Urinary bladder** - stores the urine.

**EXCRETORY PRODUCTS OF PLANTS**

i) $\text{CO}_2$ is the waste product of respiration.
ii) Oxalate crystals and cystolith are waste products stored inside the plant body after being transformed into harmless products.
iii) In older plant cells, a large vacuole contains excretory products which remain inside the body of plant for its whole life.
iv) Some waste products accumulate in the bark and leaves of trees.
The excretory system of man.

Endocrine glands in males and females.
A Single Nerve Cell

Cell-body

Axon

Axon of another cell

Nervous System of Man

Brain
Cranial nerves
Spinal cord
Spinal nerves

Nervous system of man.

Ear → Brain.

Brain → Ear.
NERVE CELLS

They are special types of cells that enable us to become aware of our environment.

SENSE ORGANS

They are organs which receive sensation from the outside world and communicate it to the brain.

Eye receives message in the form of light.
Ear receives message in the form of sound.
Nose receives message in the form of smell.
Tongue receives message in the form of chemicals.
Skin receives message in the form of temperature and pressure.

BRAIN

It is an important organ in the nervous system of man. Brain acts as a decision-making centre. Brain of man is highly evolved.

RECEPTOR ORGANS

They are organs that receive sensation from outside and communicate it to the brain.

EFFECETOR ORGANS

They are organs that carry instructions from the brain.

VOLUNTARY ACTIONS

These are actions that are controlled by a person's will.

IN Voluntary ACTIONS

These are actions not controlled by a person's will.
TRANSPARENCY 'Y'

ENDOCRINE GLANDS

These are glands that secrete special chemicals called hormones in the blood. These are ductless glands and control growth and functions of the body.

ADRENAL GLAND

It is a gland situated at the top of the kidneys. It secretes a hormone known as adrenalin.

PANCREAS

It is a gland that secretes the hormone, insulin, which controls the amount of sugar that is passed into the urine. Diabetes is caused due to the non co-ordination of insulin.

GROWTH HORMONES

These are special hormones that are present in plants that bring about movement.

Examples of movement brought about by growth hormones.

1) Ripening of fruit.
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3) Flowering.