TEACHER'S HANDBOOK

STELLAR LEARNING

Biology

9

On Board! BOOKS

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The Fundamental Unit of Life

Checkpoint (Page 6)

1. Define a cell.

Ans. A cell is defined as the basic, structural and functional unit of life.

2. Why are cells known as building blocks of life?

Ans. All living organisms are made up of cells. This is why the cells are known as building blocks of life.

3. Name the smallest and the largest cell.

Ans. *Mycoplasma gallicepticum* (a parasitic bacterium) is the smallest known cell, whereas, ostrich egg is considered to be the largest cell.

4. What are unicellular organisms? Give an example.

Ans. Unicellular organisms are organisms which consist of only one cell. *Amoeba* is an example of an unicellular organism.

5. What are multicellular organisms? Give an example.

Ans. An organism made up of many cells is known as multicellular organisms. A dog is an example of a multicellular organism.

6. What is the role of cell in the growth of an organism?

Ans. Cell division is a process in which a cell divides and makes daughters cells. This process helps in tissue growth and maintenance of multicellular organisms. On the other hand, cell division in unicellular organisms helps in reproduction.

Check Your Progress 1

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Multiple-Choice Questions

1. Cellulose forms which of the following part of a plant cell?

(a) Cell wall (b) Chloroplasts
(c) Cell membrane (d) Vacuole

Ans. (a) Cell wall

2. Which of the following cell will burst when placed in a hypotonic solution?

(a) Bacterial cell (b) Plant cell
(c) Animal cell (d) Fungal cell

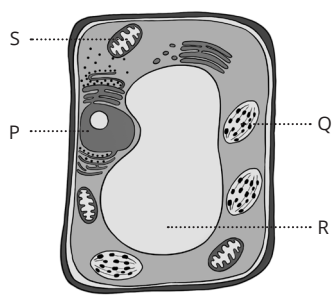
Ans. (c) Animal cell

3. The stretches of DNA which carry information for protein synthesis are called

(a) nucleus. (b) nucleolus.
(c) genes. (d) chromosomes.

Ans. (c) genes.

4. The image shows a plant cell. Which marked part is responsible for the generation of energy in the cell?



(a) P (b) Q
(c) R (d) S

Ans. (d) S

5. Plasma membrane encloses the contents of a cell. Select the incorrect option from the following regarding the role of plasma membrane.

(i) It provides an outer boundary to every cell.
(ii) It is impermeable to water.

(iii) It has carrier proteins for passive transport.

(a) Options (i) and (iii) (b) Options (ii) and (iii)

(c) Only option (ii) (d) All of these

Ans. (b) Options (ii) and (iii)

6. The nucleus controls cell metabolism and other activities of the cell. But some cells do not have nucleus when matured. A cell, devoid of nuclei, also lack in

(a) mitochondria.

(b) endoplasmic reticulum.

(c) ribosomes.

(d) chromosomes.

Ans. (d) chromosomes.

Very Short Answer Type Questions

7. Why is plasma membrane called a selectively permeable membrane?

Ans. Plasma membrane is selectively permeable, as it allows only selective particles to pass through the membrane.

8. Define plasmolysis.

Ans. Plasmolysis takes place in plant cells, where cytoplasm shrinks away from cell wall due to outward osmotic flow of water.

9. What will happen if a human red blood cell is kept in a hypertonic solution?

Ans. When placed in a hypertonic solution, a red blood cell will lose water and undergo crenation.

10. Viruses do not show any characteristic of life outside the host organism. Why?

Ans. Viruses don't have biological machinery to synthesis important biomolecules. The viral DNA or RNA incorporates itself into the host cell's genetic material and induces it to replicate the viral genome.

11. Give two examples each of unicellular and multicellular organisms.

Ans. Two examples of unicellular organisms are *Amoeba and Chlamydomonas.*

Two examples of multicellular organisms are plants, human.

12. How does *Amoeba* acquire food? What is the process called?

Ans. Amoeba obtain its food from outer surrounding with the help of finger like extensions called pseudopodia. This process is called endocytosis.

13. Differentiate between diffusion and osmosis.

Ans. Diffusion is a process in which the movement of molecules or ions of a substance takes place from region of higher concentration to region of lower concentration.

In osmosis, water molecules move from dilute solution to concentrated solution through a semi-permeable membrane.

14. Differentiate between nucleus and nucleoid. Where is DNA located in the prokaryotic cell?

Ans. **Nucleus:** It is dense, spherical or cylindrical in shape, present at the centre of a eukaryotic cell. Helps in cell division and also regulates all functions within the cell.

Nucleoid: Nucleoid on the other hand is an irregularly shaped region within the cell of a prokaryotic cells that contains all or most of the genetic material, called genophore.

15. What will happen if cell wall is not present in plant cell?

Ans. The cell wall provides vital functions to the cell including protection, rigidity and support to the plants and ultimately determines the shape of the cells.

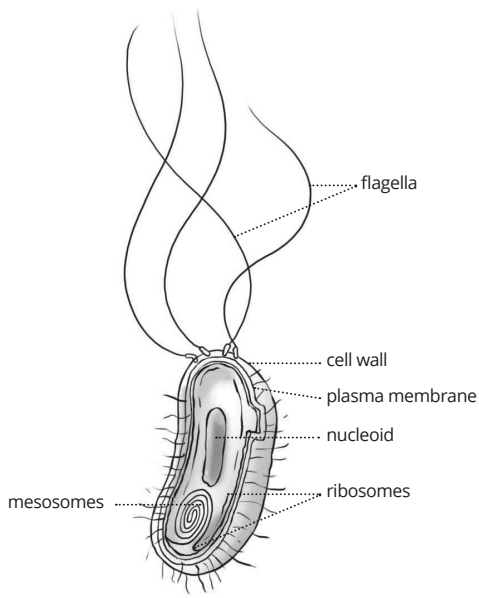
Short Answer Type Questions

16. What are genes? Where are they located? What are their functions?

Ans. Genes are the functional segments on DNA. They are present on DNA. Genes are the carriers of heredity.

17. Draw a neat and labelled diagram of a prokaryotic cell. Give two examples of prokaryotic cells.

Ans.



Labelled diagram of a prokaryotic cell

Two examples of prokaryotic cells are bacteria and blue-green algae.

18. Where are chromosomes located? What are they composed of? What is chromatin material and how does it change just before the cell divides?

Ans. Chromosomes are located in the nucleoplasm within the nuclear envelope. They are composed of DNA molecule and proteins.
Each chromosome is composed of two thread like or rod shaped structures.

Chromatin material in nucleus is a tangled fibrous mass of thread-like structures. Before cell division, DNA is duplicated, or copied. These chromatin threads organize to form chromosomes.

Long Answer Type Questions

19. Give reasons.

(a) Jams and pickles do not spoil easily.

(b) Dried raisins when kept in pure water swell up after some time.

Ans. (a) Jams have excessive sugar in it, which makes them a hypertonic solution. As a result, microbial cells invading the jam will shrink, due to movement of the water molecules outside the microbial cell and ultimately the microbial cell dies. Therefore, no microbial growth can take place and spoil it.

Pickles on the other hand, have a long shelf-life due to vinegar (acetic acid), which does not allow any microbial growth in it. Also, the medium of pickles is hypertonic, due to high salt concentration.

(b) When dried raisins are kept in the water, they swell up after sometime. This happens because the water from the surroundings diffuses into the raisins, by the process of osmosis. This happens because the solution inside raisins is more concentrated because of presence of sugar, as compared to water solution in which they are kept. So, the water molecules move from low concentrated solution to high concentrated solution through semi-permeable membrane of raisins.

20. (a) State three differences between plasma membrane and cell wall.

(b) Draw a well-labelled diagram of a plant cell and an animal cell and state the major structural difference between them.

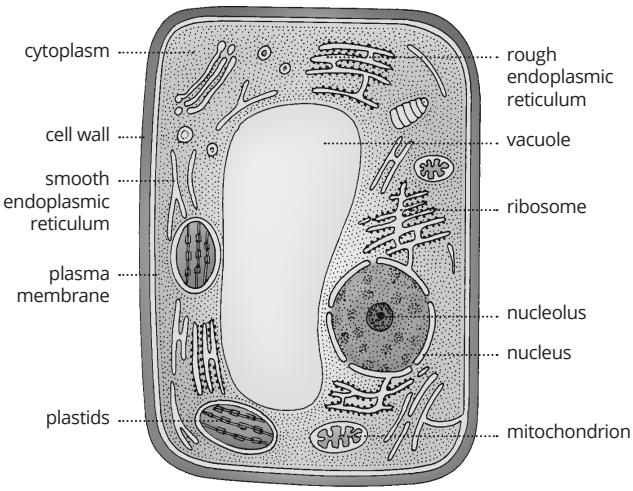
Ans. (a) The three main differences between plasma membrane and cell wall are:

(i) Plasma membrane is semi-permeable, whereas cell wall is freely permeable.

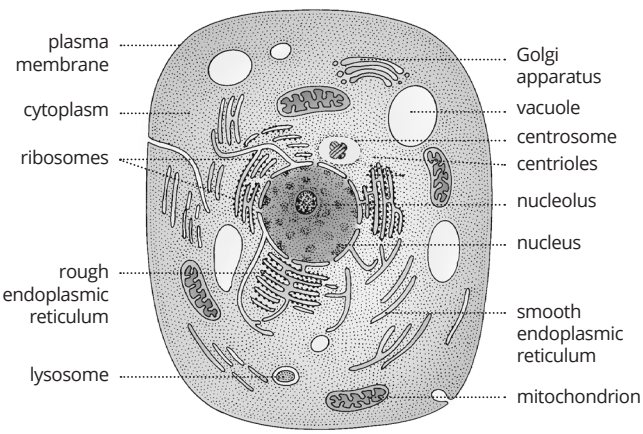
(ii) Plasma membrane is a living layer of lipo-proteins, whereas cell wall is non-living rigid, composed of cellulose.

(iii) Plasma membrane is present in all types of cells, whereas the cell wall is present in bacteria, fungi and plant cells but not in animals.

(b)



(a) Plant cell



(b) Animal cell

The major structural differences between a plant and an animal cell are as discussed here:

Plant cell	Animal cell
Comparatively larger in size	Usually smaller in size
Cell wall is present	Cell wall is absent

The components of Golgi body are diffused in plant cells and are called dictyosomes	Golgi bodies are well developed and present near nucleus
Centrosome and centrioles are absent	Centrosome and centrioles are present
Plastids are present	Plastids are absent
Reserved food is stored in the form of starch or oil	Reserve food is stored in the form of glycogen
In a mature plant cell, usually there is a single large vacuole present	Vacuoles are absent in animal cell. Even if present, they are smaller in size and are scattered.

Check Your Progress 2

(Page 23)

Multiple-Choice Questions

1. Secretion of enzymes, mucus and hormones is done by
(a) Golgi apparatus. (b) mitochondria.
(c) ribosomes. (d) plastids.

Ans. (a) Golgi apparatus.

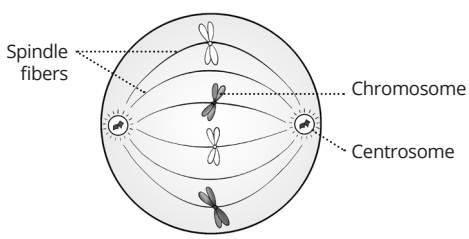
2. Lysosomes are responsible for
(a) protein synthesis.
(b) digestion of organic molecules.
(c) fat synthesis.
(d) fat emulsification.

Ans. (b) digestion of organic molecules.

3. Which is common in plant and animal cells?
(a) Centriole (b) Central vacuole
(c) Mitochondria (d) Plastids

Ans. (c) Mitochondria

4. The image shows a stage of cell division.



Based on the image, what can be a likely function of centrosome in cell division?
(a) It organizes spindle fibers and allows equal distribution of chromosomes in the daughter cells.
(b) It forms spindle fibers before the cell division starts.
(c) It degrades the spindle fibers and chromosomes when the division is complete.
(d) It releases spindle fibers that hold the chromosomes during division.

Ans. (a) It organizes spindle fibers and allows equal distribution of chromosomes in the daughter cells.

5. In an organism the gamete cells contain 16 chromosomes. What is the number of chromosomes in its tissue cells?
(a) 32 (b) 46
(c) 16 (d) 48

Ans. (a) 32

6. In a cell, DNA is present in
(a) nucleus only.
(b) nucleus, mitochondria and plastids.
(c) nucleus, Golgi bodies and plastids.
(d) nucleus, mitochondria and ribosomes.

Ans. (b) nucleus, mitochondria and plastids.

Very Short Answer Type Questions

7. Name the organelle associated with
(a) protein synthesis
(b) photosynthesis in eukaryotes.

Ans. (a) The cell organelle associated with protein synthesis is ribosome.
(b) Photosynthesis in eukaryotic cells is carried out by chloroplast.

8. Name two cell organelles having double membrane envelope. Name the membrane which covers the vacuole in plant cells.

Ans. The two cell organelles having double membrane envelope are mitochondria and chloroplasts.
Vacoule in plant cells is covered by a membrane called tonoplast.

9. Which cell organelles are called
(a) power house of the cell?
(b) suicide bags of the cell?

Ans. (a) Mitochondria are the cell organelles also known as the power house of the cell.
(b) Lysosomes are known as the suicide bags of the cell.

10. Pick the odd one out of ribosomes, Golgi apparatus, mitochondria, endoplasmic reticulum and give suitable reasons.

Ans. Ribosomes are the odd one here in the group. Golgi apparatus, mitochondria and endoplasmic reticulum are all having a membrane envelope, whereas the ribosomes have no membrane.

11. Name the organelle which provides turgidity to the plant cell. Name any two substances stored in it.

Ans. The vacuole provides turgidity to the plant cell. It helps in storage of enzymes and water.

12. Differentiate between lysosome and ribosome.

Ans. The main difference between lysosomes and ribosmes are that lysosomes contain the digestive enzymes in the cell whereas ribosomes synthesize proteins required by the cell.

13. Give scientific reasons for the following:

(a) Inner membrane of mitochondria is deeply folded.

(b) Mitochondria are able to make some of their proteins.

(c) Plastids are not present in animal cells.

Ans. (a) Inner membrane of mitochondria is deeply folded so as to provide more surface area for the biological processes (chemical reactions).

(b) Mitochondria, being a cell organelle also carries a copy of a DNA and that way also makes some protein molecules required within.

(c) Animal cells do not contain plastids because it often contain pigments used in photosynthesis and provide colour to the cell.

14. Mention the strange similarity between plastids and mitochondria with reference to synthesis of their own materials. What do they synthesise?

Ans. Plastids and mitochondria both are capable of carrying self replication. These two organelles carry their own copy of DNA and ribosomes. They synthesise proteins necessary for replication.

Short Answer Type Questions

15. Name the organelle involved in the formation of lysosomes. Name the type of enzymes found in lysosomes. Where are they synthesised?

Ans. Lysosomes are formed from the Golgi bodies. Lysosomes are actually membranous sacs budded off from the Golgi apparatus.

As lysosomes are associated with intra-cellular digestion, they contain digestive enzymes, such as glycosidases, proteases and sulfatases. Enzymes of the lysosomes are synthesised in the rough endoplasmic reticulum. These enzymes are then imported to Golgi apparatus in small vesicles. Here these enzymes are modified. Then these small vesicles fuse with larger acidic vesicles and are budded off.

16. Describe the structure and function of Golgi apparatus.

Ans. Structure:

Golgi apparatus consists of a system of membrane-bound vesicles which are arranged somewhat parallel to each other in stacks called cisterns. They are often connected to the membranes of endoplasmic reticulum forming complex cellular membrane system. Golgi apparatus has three distinct components visible as flattened sacs or cisternae, clusters of tubes and vesicles, and vacuoles. There are many freely scattered sub units of Golgi apparatus in plant cells. These units are called dictyosomes.

Functions:

Golgi apparatus helps in the secretion of mucus, enzymes and hormones.

It helps in the storage, modification and packaging of secretory products in the vesicles.

It helps in the formation of lysosomes.

In some cases, it helps in the manufacture of complex sugars from simple sugars.

17. Differentiate between rough and smooth endoplasmic reticulum. How is endoplasmic reticulum important for membrane biogenesis?

Ans. Rough endoplasmic reticulum (RER) and smooth endoplasmic reticulum (SER).

RER possesses ribosomes on its surface, whereas SER doesn't have ribosomes on its surface.

RER is mainly formed of cisternae and a few tubules, SER on the other hand is formed of vesicles and tubules.

RER helps in the formation of lysosomes through Golgi apparatus, whereas, SER gives rise to sphareosomes.

RER is mostly located at the central part of the cell and connected with nuclear envelope. On the other hand SER is often peripheral and may be connected with plasmalemma.

In the process of membrane biogenesis, there is formation of plasma membrane with the help of proteins and lipids. As we know, there are two types of endoplasmic reticulum. Smooth endoplasmic reticulum helps in the synthesis of lipids and hormones. On the other hand, rough endoplasmic reticulum has ribosomes on its surface, which help in synthesis of proteins in the cell. This way, endoplasmic reticulum helps in the biogenesis of the membrane of a cell.

18. What are the characteristic features of a mitotic and meiotic cell division?

Ans. Characteristic features of a mitotic and meiotic cell division:

Mitosis or mitotic cell division is an equational division in which one parent cell divides to form two daughter cells. The daughter cells are identical to each other and also to the parent cell in every respect. In mitosis, the same normal chromosome number of the parent cell is maintained at each stage of mitotic division of the cell.

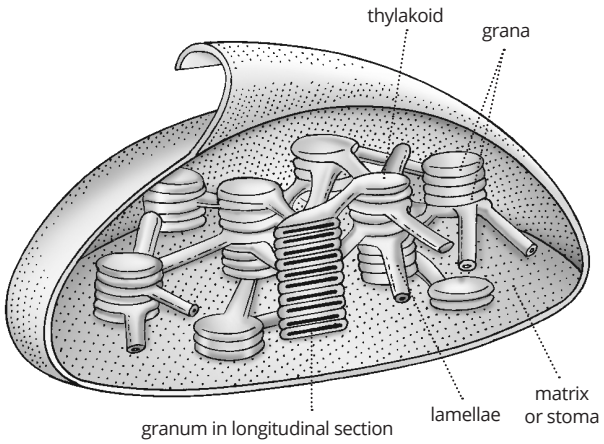
Meiosis takes place in the reproductive cells that produce gametes, sperms and ova. Meiosis is a modified mitosis in which chromosomes divide once and the nucleus divides twice. As a result of which the number of chromosomes is reduced to half. Hence meiosis is a reductional division.

Long Answer Type Questions

19. Which type of plastids help in photosynthesis? Briefly explain its structure with the help of a labelled diagram.

Ans. Plastids are the cell organelles found in plant cells. Plastids are classified into three different categories – chromoplasts, chloroplasts and leucoplasts. Chloroplasts are the plastids which are green in colour and are associated with the process of photosynthesis.

The chloroplasts has a colourless ground matrix, stroma and a membranous system called grana. Each granum has membrane-bound sacs called thylakoids. These thylakoids possess photosynthetic green pigment called chlorophyll.



Sub-microscopic structure of the chloroplast

20. (a) Why does plant cells possess larger sized vacuoles?

(b) Write the difference between leucoplasts and chloroplasts.

(c) What is the role of vacuoles in *Amoeba* and *Paramoecium*?

Ans. (a) Vacuoles are the fluid-filled membrane-bound spaces, which stores liquid or solid content. Though they are present in both plant as well as animal cells, but the size of vacuoles in animal cells is smaller than that in plant cells. In mature plant cells, the smaller vacuoles fuse to form a single large central vacuole. This vacuole occupies 50-90 % of the cell volume in plants. In plant cells, vacuoles are full of cell sap and provide turgidity and rigidity to the cell. They also play a role in growth by elongation of the cells.

(b) Leucoplasts are the colourless plastids and they store substances like starch, oils and protein granules. On the other hand, chloroplasts are green plastids as they contain chlorophyll and are associated with the process of photosynthesis.

(c) In single-celled organisms such as *Amoeba*, the vacuoles are modified as food vacuoles. The food vacuole contains food items that *Amoeba* has consumed. In a single-celled organism like *Paramoecium*, the vacuoles are specialized to expel excess water and some waste from the cell.

Higher Order Thinking Skills (HOTS) Questions

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1. What will happen if:

(a) Excess amount of fertiliser is added to green grass lawn?

(b) Salt is added to cut pieces of raw mangoes?

Ans. (a) Adding excess amount of fertilisers to the green grass lawn would adversely affect the absorption of water by the roots. As excess of fertilisers will make soil hypertonic and decrease the absorption capacity of the plants.

(b) If salt is added to the cut piece of mango, the pieces will shrink because the water content inside a raw mango pieces is more than salt. Salt will absorb the water from raw mango pieces and the pieces will shrink.

2. Two *Rhoeo* peels were taken. One peel was put in a petridish containing cold water and the other was kept in a petridish containing boiling water. After a while, both were transferred to hypertonic solutions. If the peels are observed under the microscope, will there be any difference in the observation of both the peels. Give reasons to support your answer.

Ans. On observation, it is found that the *Rhoeo* peel, which was put in a petridish containing cold water and then transferred to a hypertonic solution show plasmolysis. The green leaf peel lose water and shrink the cell contents away from the cell wall. On the other hand, the *Rhoeo* peel kept in a petridish containing hot water and then transferred to hypertonic solution doesn't show any plasmolysis. This is because the hot water kills the plant cells and water moves freely in and out of dead plant cell membrane.

3. A person takes a concentrated solution of common salt. After sometime, he starts vomiting. What is the phenomenon responsible for such a situation? Explain.

Ans. When a solution containing excess of salt is consumed, then due to the process of osmosis water will move into the intestine. This puts pressure on the intestinal walls and also causes nausea. The intestinal wall is not able to tolerate

this strain, and hence this excess water retention causes vomiting.

4. During an activity, the teacher told in the class that fruit is green when raw, but becomes beautifully coloured when ripe. How does this change occur? What is the importance of this change? Does colour change appear in flowers also?

Ans. The ripening process begins, in many fruits triggered by the naturally produced gas called ethylene. This gas initiates certain bio-chemical reactions taking place in a cell. Chloroplasts are then converted to chromoplasts which makes the colour change. During this process, the fruit becomes sweet and tasty. So, this colour change is an indication that fruit is now ripe and ready to be consumed.

Flowers are mostly bright and colourful as they also contain certain pigments. Flowers are colourful so as to attract insects and other animals for the process of pollination. Once the pollination is over the colour in flowers also fades.

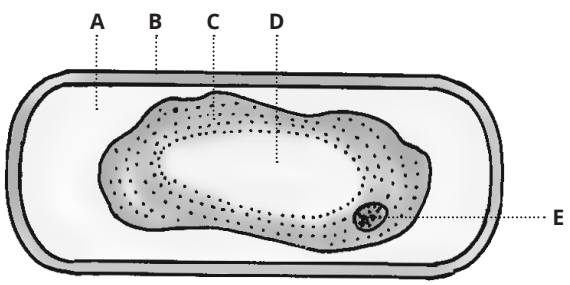
5. If due to some chemical or physical influence, the organisation of a cell is destroyed, then what will happen to the cell?

Ans. Due to any chemical or physical influence, if the organisation of the cell is destroyed, then a cell wouldn't be able to perform the basic functions and will ultimately die.

6. The given diagram represents a plant cell after being placed in a strong sugar solution. Guidelines A to E indicate the following:

(A) Strong sugar solution
(B) Cell wall
(C) Protoplasm
(D) Large vacuole
(E) Nucleus

Study the diagram and answer the following questions.



(a) What is the state of the cell shown in the diagram?
(b) Name the structure which acts as a selectively permeable membrane.
(c) If the cell was placed in distilled water instead of strong sugar solution, which feature would not have been present?
(d) If the cell in the diagram possessed chloroplasts, where would these be present?
(e) Name any one feature of this plant cell which is not present in animal cell.

Ans. (a) Cell shown in the diagram is in plasmolysed condition.
(b) Cell membrane acts as selectively permeable membrane.
(c) If we place a plant cell in a distilled water then water will move into the cell. This is due to the fact that concentration of solution is higher inside the cell as compared to outside distilled water. This way, the plant cell will swell up and become turgid.
(d) Chloroplasts in plant are present in the cytoplasm of the leaves and green stem.
(e) Plant cells have cell wall which is not present in animal cell.

Self-Assessment

(Page 26)

Multiple-Choice Questions

1. Chlorophyll is present in chloroplast in
(a) inner membrane.
(b) thylakoid membranes.
(c) stroma.
(d) outer membrane.

Ans. (b) thylakoid membranes

2. A solution is said to be hypotonic when
(a) concentration of medium is higher than that of the cell.
(b) concentration of medium is equal to that of the cell.
(c) concentration of medium is lower than that of the cell.
(d) none of the above.

Ans. (c) concentration of the medium is lower than that of the cell.

3. The table lists some functions performed by some cell structures.

Name of cell organelle	Function
P	It separates the content of the cell from the surroundings.
Q	It is a site where many cellular processes occur.
R	It controls the process of cell division.
S	It controls the movement of substances in and out of the cell.

Which option shows the organelle correctly matched with the respective function?
(a) Cytoplasm- Q and S, nucleus- P, plasma membrane- R
(b) Cytoplasm- Q and R, nucleus- P, plasma membrane- S

(c) Cytoplasm- Q, nucleus- R, plasma membrane- S and P

(d) Cytoplasm- R, nucleus- Q, plasma membrane- S and P

Ans. (c) Cytoplasm- Q, nucleus- R, plasma membrane- S and P

4. Lipid synthesis is performed by

(a) rough ER. (b) smooth ER.

(c) ribosome. (d) lysosome.

Ans. (b) smooth ER.

5. Which one of the following best describes the functions of a cell membrane?

(a) It keeps the cell in shape

(b) It controls the substances entering and leaving the cell

(c) It controls the substances entering the cell

(d) It supports the cell structures

Ans. (b) It controls the substances entering and leaving the cell

6. A cell has 16 chromosomes. What will be the number of chromosomes after mitotic cell division?

(a) 32 (b) 16

(c) 8 (d) 48

Ans. (b) 16

Assertion–Reason Type Questions

For question numbers 7 to 14, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both A and R are true and R is the correct explanation of the assertion.

(b) Both A and R are true but R is not the correct explanation of the assertion.

(c) A is true but R is false.

(d) A is false but R is true.

7. Assertion: Ostrich egg is the biggest cell.
Reason: RBCs are biconcave in shape.

Ans. (b)

8. Assertion: Plant cell will lose water when kept in a hypertonic solution.
Reason: Plant cell will lose water due to endosmosis when kept in a hypotonic solution.

Ans. (c)

9. Assertion: Plasma membrane is selectively permeable.
Reason: Plasma membrane is made up of lipids and proteins.

Ans. (a)

10. Assertion: Plant cells contain plastids with green pigment called chlorophyll.
Reason: Plants are photoautotrophic organisms.

Ans. (a)

11. Assertion: Ribosomes are double membrane bound organelle.
Reason: Mitochondria and chloroplast have their own DNA.

Ans. (d)

12. Assertion: In a plant cell the nucleus is present on one side.
Reason: Plant cells have a large, single central vacuole.

Ans. (a)

13. Assertion: Bacterial cells do not have a true nucleus.
Reason: Bacterial cells do not have genetic material.

Ans. (c)

14. Assertion: Lysosomes are known as suicidal bags of the cell.
Reason: Lysosomes burst and kill their own cells under certain conditions.

Ans. (a)

Source-based/Case-based/Passage-based/ Integrated assessment questions

Answer the questions on the basis of your understanding of the following passages and the related studied concepts.

15. Rahul loves gardening. He has a lot of indoor and outdoor plants. During summer, the gardener forgot to water the plants for a day. When Rahul saw the plants, they were wilted and he got worried. His mother explained that he should not worry and if he puts water, the plants will revive and that's exactly what happened much to the relief of Rahul.

I. (a) What happened to the plants at cellular level when they were not watered?

(b) What was the reason of revival of the plants after watering?

(c) (i) Define osmotic pressure.

OR

(ii) What is the chemical composition of plant cell wall?

Ans. (a) Plant cells lost turgidity and shrink when not watered properly.

(b) Plant cells were revived after watering as they regained their turgor pressure.

(c) (i) The minimum pressure exerted by a solution to prevent the entry of its pure solvent through the semi-permeable membrane is called osmotic pressure.

OR

(ii) Cell wall is mainly consists of cellulose. Other components include polysaccharides, hemicellulose and pectin.

II. (a) Which of the following processes does occur at cellular level in plants when they were not watered?

(i) Imbibition (ii) Plasmolysis
(iii) Deplasmolysis (iv) Endosmosis

Ans. (ii) Plasmolysis

(b) The reason of revival of plants after watering is

(i) exosmosis. (ii) plasmolysis.
(iii) endosmosis. (iv) gaseous diffusion.

Ans. (iii) endosmosis.

(c) Osmotic pressure of a solution is

(i) the minimum pressure needs to be applied to prevent the inward flow of its solvent across a semipermeable membrane.
(ii) the maximum pressure needs to be applied to prevent the outward flow of its solvent across a semipermeable membrane.
(iii) the minimum pressure needs to be applied to prevent the inward flow of its solute across a permeable membrane.
(iv) the minimum pressure needs to be applied to prevent the inward flow of its solvent across a permeable membrane.

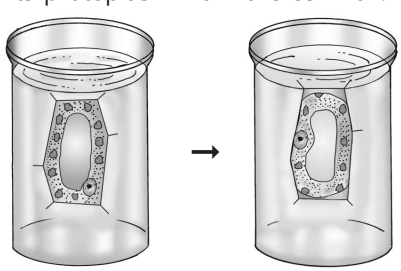
Ans. (i) the minimum pressure needs to be applied to prevent the inward flow of its solvent across a semipermeable membrane.

(d) The chemical constituent of plant cell wall is mainly

(i) chitin. (ii) cellulose.
(iii) muramic acid. (iv) lipid.

Ans. (ii) cellulose.

(e) As shown in the given figure, a plant cell is kept in a solution. After one hour it shows shrinkage of its protoplasm from the cell wall.



The solution used in this experiment, is

(i) hypotonic.
(ii) isotonic.
(iii) hypertonic.
(iv) none of these.

Ans. (iii) hypertonic.

16. All multicellular living organisms grow by a process called cell division. It is of two types – mitosis and meiosis. Mitotic division leads to the formation of two daughter cells with equal number of chromosomes as the parent cells. It occurs during growth, repair and regeneration of cells. On the contrary, meiotic division leads to the formation of four cells with half the chromosome number as that of the parent cell. This type of division occurs during sexual reproduction.

I. (a) How is the growth of living organisms different from that of the non-living organisms?

(b) Write alternative names used for mitosis and meiosis.

(c) (i) What role does meiosis play in sexual reproduction?

OR

(ii) What is cell division?

Ans. (a) Living things grow through internal metabolic processes while non-living things can only grow by adding something from outside.

(b) Alternative name for mitosis: equational division

Alternative name for meiosis: reductional division

(c) (i) Meiosis takes place in the reproductive cells that produce gametes, sperms and ova.

OR

(ii) Cell division is a process by which new cells arise from pre-existing cells.

II. (a) Mitosis is also called equational division because

(i) daughter cells are equal in size.
(ii) daughter cells have same number of chromosomes.
(iii) parent cell and daughter cells are equal in size.
(iv) parent cell and daughter cell have same number of chromosomes.

Ans. (iv) parent cell and daughter cell have same number of chromosomes.

(b) In which stage of mitosis are chromosomes arranged in equatorial position of the cell?

(i) Prophase (ii) Metaphase
(iii) Anaphase (iv) Telophase

Ans. (ii) Metaphase

(c) Which of the following roles does meiosis play in sexual reproduction?

(i) Restores the chromosome number
(ii) Causes genetic recombination
(ii) Bring variations
(iv) All of these

Ans. (iv) All of these

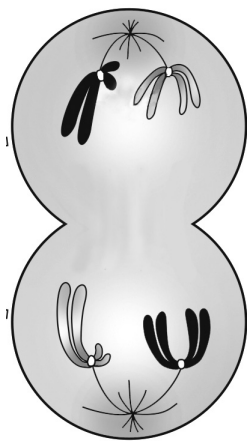
(d) Which of the following is/are produced after meiosis?

(i) Gamete (ii) Sperm

(iii) Ova (iv) All of these

Ans. (iv) All of these

(e) A dividing cell is shown in the given figure. Study the figure.



It is a stage of cell division showing

(i) mitosis in animal cell.

(ii) mitosis in plant cell.

(iii) meiosis in animal cell.

(iv) meiosis in plant cell.

Ans. (iii) meiosis in animal cell.

17. *Chlamydomonas*, *Paramecium* and *Amoeba* are considered as unicellular organisms. The single cell performs all the functions of their body. Multicellular organisms are made up of many cells that are grouped together to perform specific functions. Each living cell has the capacity to perform certain basic functions like, respiration, excretion etc. There is a division of labour in multicellular organisms. Different parts of the body perform different functions. In a similar way, there is division of labour in each cell. Each cell contains a variety of cell organelles that perform different functions. A cell can live and function properly because of these cell organelles.

I. (a) What kind of nuclear structure is evident in unicellular organisms discussed in the passage?

(b) What is the function of plastid in a green plant part?

(c) (i) A cell has a large central vacuole. Is it a plant or animal cell?

OR

(ii) Each cell shows division of labour. Explain.

Ans. (a) In unicellular organisms like *Amoeba,* the nuclear structure is typically a simple eukaryotic structure with a membrane-bound nucleus, responsible for processes like cell division and metabolic regulation. This nucleus contains a nucleolus and chromatin, which regulates genetic information.

(b) The green plastids help in photosynthesis and thus help in the synthesis of food.

(c) (i) A cell with a large central vacuole is a plant cell.

OR

(ii) In multicellular organisms, each cell specializes in a particular function, exhibiting division of labour. This enables efficient organismal function, as cells differentiate to perform tasks like energy production, protection, or reproduction. Specialized cells work together, coordinating their functions to maintain homeostasis and ensure survival and growth of the organism.

II. (a) Features of animal cell can be found in a slide containing

(i) onion peel. (ii) cork slice.

(iii) cheek cells. (iv) leaf epidermis.

Ans. (iii) cheek cells

(b) Plastids are important to a plant cell. Without plastids plant cells cannot

(i) break glucose. (ii) divide into new cells.

(iii) produce glucose. (iv) break proteins.

Ans. (iii) produce glucose

(c) A cell has a large central vacuole. It is a

(i) plant cell. (ii) animal cell.

(iii) fungal cell. (iv) bacterial cell.

Ans. (i) plant cell

(d) An energy requiring cell have more number of

(i) plastids. (ii) mitochondria.

(iii) ribosomes. (iv) Golgi bodies.

Ans. (ii) mitochondria

(e) Which of the following do not possess nuclear membrane?

(i) Yeast (ii) *Amoeba*

(iii) *Paramecium* (iv) Blue-green algae

Ans. (iv) Blue-green algae

Very Short Answer Type Questions

18. Name the main constituent substance present in plant cell wall and state its function.

Ans. The main constituent substance present in plant cell wall is polysaccharide cellulose. This cellulose provides rigidity to the plant cell.

19. State the function of chromosomes in a cell.

Ans. Chromosomes are composed of DNA molecules and proteins. The information for inheritance of characteristics from parents to next generation

passes in the form of DNA. It also contains the information for the cell construction and organization.

20. Name the organelle which is called the 'ribosome factory'.

Ans. The nucleolus is a dense round structure attached to a chromatin fibre at a specific region. This nucleolus is called the ribosome factory of the cell.

21. What would happen to the life of a cell, if there are no vacuoles?

Ans. Vacuole provides rigidity and turgidity to the plant cell. In case of *Amoeba*, vacuole contains food item it has consumed. In case of *Paramoecium*, the vacuoles help to expel excess water and wastes from the cell. This way cells not having vacuoles will face difficulty to survive, as they play a vital role in maintenance and functioning of the cells and unicellular organisms.

22. State two important functions of the nucleus of a cell.

Ans. (i) The nucleus is called Master or Director of the cell as it controls cell metabolism and other activities.

(ii) It plays a central role in cellular reproduction.

23. What is endocytosis? Name an organism that feed by this process.

Ans. Endocytosis is a cellular process in which substances are brought into the cell. The material to be internalized is surrounded by an area of plasma membrane, which then buds off inside the cell to form a vesicle containing the ingested material. *Amoeba* and other single celled organisms feed using the process of endocytosis.

24. (a) Name the cell organelle which helps in packaging and dispatching the material synthesised over the endoplasmic reticulum to various targets inside and outside the cell.

(b) Name and write the functions of the cell organelle formed by the help of Golgi apparatus.

Ans. (a) Golgi apparatus helps in packaging and dispatching the material synthesised over the endoplasmic reticulum, to various targets inside and outside the cell.

(b) Golgi apparatus also helps in the formation of lysosomes.

Functions of lysosomes:

(i) Lysosomes help in the intracellular digestion.

(ii) They provide energy during starvation by controlled break down of the stored food.

(iii) Lysosomes bring about cellular break down and are associated with ageing.

25. (a) What is DNA? Where is it found?

(b) Name the functional segment of DNA?

Ans. (a) DNA is deoxyribonucleic acid, a hereditary material composed of two chains that coil around each other. DNA is found in the nucleus of the cells.

(b) Functional segments of DNA are called genes. They are the carriers of the heredity.

26. State cell theory. Name the scientist who proposed it.

Ans. The cell theory states that the cell is the basic structural and functional unit of all living beings. Cell theory was proposed by Matthias Schleiden and Theodore Schwann. Later on Rudolf Virchow added the phrase *Omnis cellula-e-cellula* meaning all cells arise from pre-existing cells.

Short Answer Type Questions

27. (a) Differentiate between a plant cell and an animal cell.

(b) Explain the concept of division of labour in multicellular organisms giving an example.

Ans. (a) The major structural differences between a plant and an animal cell are as discussed here:

Plant cells are comparatively larger than animal cells.

Plant cells have cell wall, whereas animal cells don't have cell wall.

Plastids are present in plant cell but are absent in animal cell.

There is single large vacuole present in centre of a plant cell, whereas they are smaller in size in case of animal cells.

(b) There are division of labour in multicellular organisms and within a single cell in many cases. This is because each cell has certain specific components within it known as cell organelles. Each cell organelle performs a specific function.

28. Do all cells of our body look alike in terms of shape, size and structure? Give reasons. What similarities do they have?

Ans. Cells show a great variation in their size and shapes. Most cells have a definite shape, usually

they show spindle, elongated, oval and branched shapes. Although cells of different organisms differ in structure, shape, size and function within the body of a multicellular organism, the cells show the same basic structure. All cells have cell membranes, nucleus, cytoplasm etc.

Long Answer Type Questions

29. (a) What are lysosomes? Why are they called suicide bags of a cell?

(b) Dried raisins when kept in pure water swell up after some time. What is the reason for this change? What will happen if these raisins are put into concentrated saline solution?

Ans. (a) Lysosomes are membrane-bound sacs filled with digestive enzymes. These digestive enzymes are made by rough endoplasmic reticulum. They have resistant covering membrane which protects the cell from the action of the enzymes. Lysosomes help in waste disposal from the cell. They digest any foreign material as well as any worn-out cell organelles and hence keep the cell free from any unwanted waste material. In case the cell gets damaged, lysosomes burst release the enzymes, which digest their own cell. Hence, they are called suicide bags of the cell.

(b) Dried raisin when kept in pure water swell up. This is because the water diffuses inside the raisins through semi-permeable membrane by the process of osmosis. As the concentration of the water molecules outside the raisins is higher than the concentration of water molecules inside the raisins. So, the water moves across the semi-permeable membrane from the region of higher concentration to lower concentration. When put in concentrated saline solution, the raisins will shrink.

30. (a) Draw the diagram of a typical plant cell and label the following parts:

(i) powerhouse of the cell

(ii) dead and permeable layer

(iii) kitchen of the cell

(iv) control centre of the cell

(v) allows the entry and exit of material across the cell

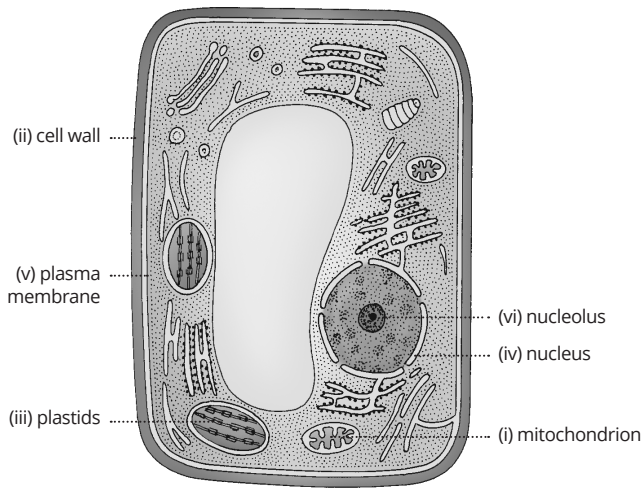
(vi) ribosome factory

(b) State main functions of

(i) Golgi apparatus

(ii) endoplasmic reticulum

Ans. (a)



Plant cell

(b) Golgi apparatus functions:

(i) Golgi apparatus helps in the secretion of mucus, enzymes and hormones. The material synthesized near the endoplasmic reticulum is transported to various targets inside and outside the cell.

(ii) It stores and modifies and also helps in packaging of secretory products in the vesicles.

(iii) It also helps in the formation of lysosomes.

Endoplasmic reticulum functions:

- Endoplasmic reticulum divides cytoplasm into smaller compartments and provides rigidity to the cell.
- It helps in intracellular transport of different materials by forming channels, it is also known as the circulatory system of the cell.
- It acts as a cytoplasmic framework and provides a large surface area inside the cell for various biochemical activities.
- In the liver cells of vertebrates, smooth endoplasmic reticulum helps in the detoxification of many poisons and drugs.

Let's Compete

(Page 29)

Multiple-Choice Questions

1. A cell placed in solution swells up. The solution is

(a) hypertonic. (b) isotonic.
(c) hypotonic. (d) both (a) and (b).

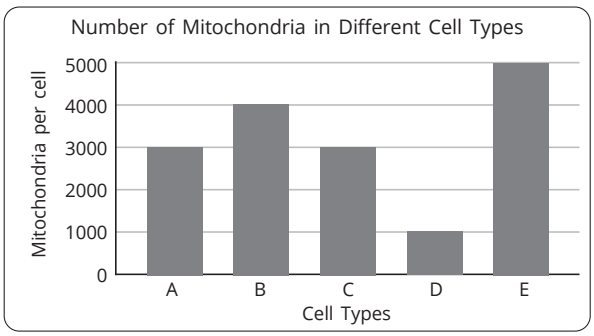
Ans. (c) hypotonic

2. Organelle without a cell membrane is

(a) ribosome. (b) nucleus.
(c) mitochondria. (d) chloroplast.

Ans. (a) ribosome

3. The given bar diagram shows different number of mitochondria in five different cells (A, B, C, D and E).



Select the incorrect option from the following based on this given diagram.

(a) Cell types A and C need the same amount of energy to function.

(b) Cell type B needs less energy than C.

(c) Cell type E shows maximum energy requirement.

(d) Cell type D shows minimum energy requirement.

Ans. (b) Cell type B needs less energy than C.

4. The colourless dense sap present inside the nuclear membrane is called

(a) cytoplasm. (b) stroma.

(c) matrix. (d) nucleoplasm.

Ans. (d) nucleoplasm

5. The function of mitotic cell division is

(a) formation of male gamete.

(b) formation of two daughter cells.

(c) formation of female gamete.

(d) All of the above.

Ans. (b) formation of two daughter cells.

6. Cell wall of which one of these is not made up of cellulose?

(a) Mango tree (b) Fungi

(c) Lotus (d) Cactus

Ans. (b) Fungi

7. The food engulfed as food vacuole by *Amoeba* is digested with the help of enzymes in the

(a) ribosomes.

(b) contractile vacuole.

(c) lysosomes.

(d) rough endoplasmic reticulum.

Ans. (c) lysosomes

8. An eukaryotic nucleus has a

(a) porous and single membrane.

(b) non-porous and single membrane.

(c) porous and double membrane.

(d) non-porous and double membrane.

Ans. (c) porous and double membrane

9. The membrane of Golgi apparatus has connections with those of

(a) nuclear membrane.

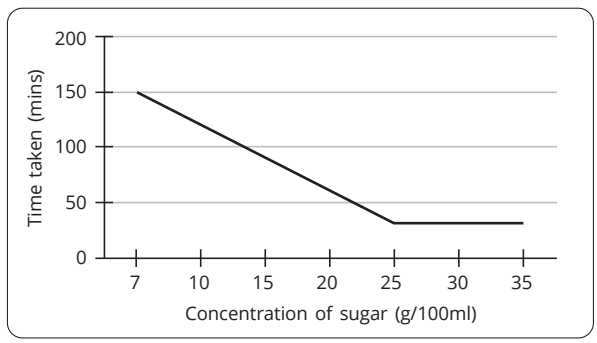
(b) endoplasmic reticulum.

(c) cell membrane.

(d) mitochondria.

Ans. (b) endoplasmic reticulum.

10. The given graph shows rate of osmosis with concentration of sugar solution in an experiment. Select the most suitable option out of the following.



(a) Rate of osmosis decreases as the concentration of the solute is increased.

(b) Rate of osmosis decreases as the concentration is increased till a certain limit and remains constant after that.

(c) Rate of osmosis increases as the concentration of the solute is increased.

(d) Rate of osmosis increases as the concentration is increased till a certain limit and remains constant after that

Ans. (d) Rate of osmosis increases as the concentration is increased till a certain limit and remains constant after that

Life Skills

(Page 30)

1. Mohit and Sunil are classmates who usually stand first and second, respectively in their class examinations. They are friends too. However, Sunil wants to do better than Mohit and stand first in the exams. Once in the practical examination, the teacher gave them an experiment. In the

experiment, potato cubes of 2 cm^3 were to be placed in two containers, one containing water and other containing concentrated sugar solution and effect was to be seen after 24 hours. However, Sunil disturbed the experimental set-up of Mohit and replaced the water with concentrated sugar solution.

Use the above information and answer the following questions:

(a) Do you think what Sunil did was wrong? Why?

(b) What experimental process was being studied in the experiment?

(c) What change do you expect in the experimental set-ups of Mohit and Sunil after 24 hours? Give reasons in support of your answer.

Ans. (a) Yes. Whatever Sunil did was wrong. A person should follow an honest approach in life. If someone wants to succeed in life, then she/he should work hard to do better in studies or profession. We should always have a healthy competition with our classmates.

(b) Here the students were studying the process of osmosis in the experiment set-up.

(c) In case of Sunil's experiment, one potato cube which was placed in water will swell up due to the osmosis (inward movement of water) of water in the cells. This is because the concentration of water molecules is higher outside the cell in the container. So water moves from container to inner side of the cells. The second potato cube which was kept in concentrated sugar solution will shrink. This happens because the concentration of water molecules in potato cubes is higher than that in sugar solution. So, the water moves from the region of higher concentration, i.e., potato cubes to concentrated sugar solution.

In case of Mohit's experimental set-up, both the potato cubes will be shrinked, as Sunil replaced the water container with concentrated sugar solution.

2. Ramesh noticed that while cooking *kheer*, his mother had kept raisins in plain water. After sometime, he observed that the raisins had swollen. This amazes Ramesh and he asks his biology teacher the reason for this. The teacher explains the reason.

(a) Why did the raisins swell up when kept in plain water? What term is used for this phenomenon?

(b) What will happen if these raisins are kept in concentrated sugar solution?

(c) What values are shown by Ramesh?

Ans. (a) When the raisins are placed in a hypotonic solution, such as water, they will swell up. This is due to the movement of water molecules across the semipermeable membrane of cells in raisins. This process of movement of water molecules across the semipermeable membrane is called osmosis. As the movement of water molecules is inside the raisins so it is called endosmosis.

(b) If these raisins are kept in concentrated sugar solution, then water molecules will move outside by the process of osmosis and the raisins will shrink. This is because the concentration of water molecules inside the raisins is more than outside concentrated sugar solution. Water molecules will move from its higher concentration (raisins) to lower water molecules concentration region (sugar solution). As the movement of water here in this case is outside from the raisins, it is known as exosmosis.

(c) The values shown here by Ramesh are observational and analytical.

3. Ishita observed a slide of an eukaryotic cell under electron microscope and complained that it contained structures showing rough and uneven surfaces.

(a) Name the organelle observed by Ishita.

(b) Why did she complain about the rough surface?

(c) What is the function of the oragnelle?

(d) What values are shown by Ishita?

Ans. (a) The organelle observed by Ishita under an electron microscope was rough endoplasmic reticulum (RER).

(b) Because this organelle has ribosomes attached to its surface, so it looks rough. The endoplasmic reticulum without ribosomes attached to its surface looks smooth and is known as smooth endoplasmic reticulum (SER).

(c) Rough endoplasmic reticulum is associated with synthesis of proteins with the help of ribososmes attached to its surface.

(d) The values shown here by Ishita are observational skills.

6

Tissues

Checkpoint (Page 33)

1. Define tissue.

Ans. Tissues are a group of cells that are similar in structure and perform similar function.

2. Name two vascular tissues in plants.

Ans. Vascular tissues in plants are xylem and phloem.

3. Name the tissue which conducts water and minerals in plants.

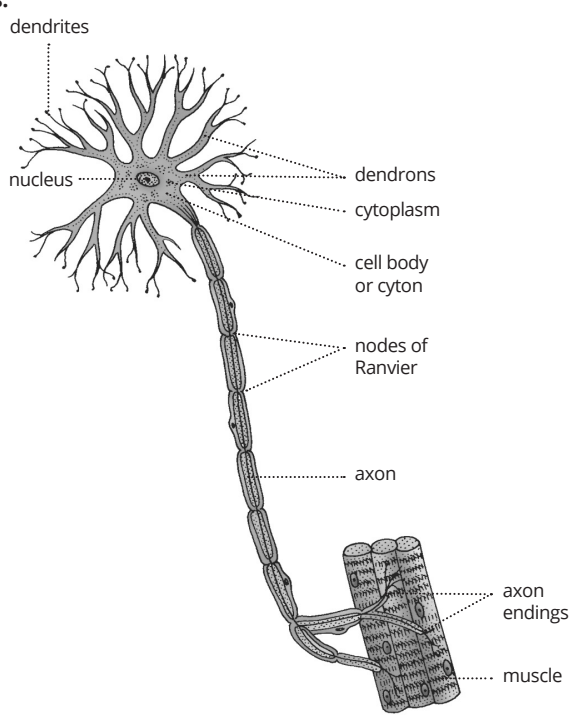
Ans. Xylem

4. Name the tissue which conducts food in plants.

Ans. Phloem

5. Draw the structure of a typical nerve cell.

Ans.



A nerve cell or neuron

6. State the functions of nerve cells in animals.

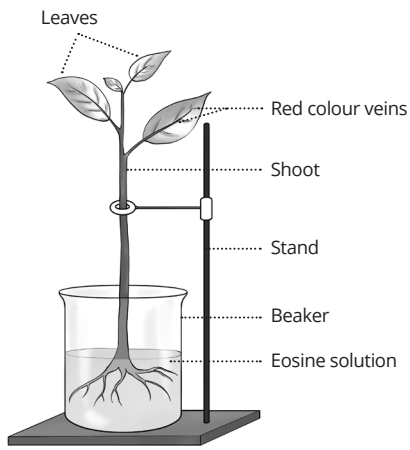
Ans. Nerve cells are specialized to respond to stimuli and transmit stimulus very rapidly from one part to another within the body.

Check Your Progress 1

(Page 42)

Multiple-Choice Questions

1. A student takes a leafy green Balsam plant and places it in Eosin solution. The solution is a red coloured dye. After 4 hours, the student observes that the red colour appears on the parts of the plant body. Which type of tissue is responsible for these changes?



(a) Xylem, as it helps in the movement of water from roots to stem and leaves

(b) Phloem, as it helps in the movement of water from roots to stem and leaves

(c) Xylem, as it helps in the movement of water from leaves to roots and stem

(d) Phloem, as it helps in movement of water from leaves to roots and stem

Ans. (a) Xylem, as it helps in the movement of water from roots to stem and leaves

2. The air-filled tissues of aquatic plants are called

(a) collenchyma. (b) chlorenchyma.

(c) aerenchyma. (d) sclerenchyma.

Ans. (c) aerenchyma.

3. A living mechanical tissue having cellulose wall thickening is

(a) collenchyma. (b) parenchyma.

(c) aerenchyma. (d) sclerenchyma.

Ans. (a) collenchyma.

4. Cork is a/an

(a) intercalary meristem. (b) lateral meristem.

(c) protective plant tissue. (d) apical meristem.

Ans. (c) protective plant tissue.

5. Meristematic tissue in plant is categorized as apical, lateral and intercalary on the basis of

(a) shape. (b) position.

(c) function. (d) types of cells.

Ans. (b) position.

6. Which of the following options describe parenchyma tissue?

(i) Simple permanent living tissue

(ii) Provides elasticity to the plant organs

(iii) Loosely packed

(iv) Cell walls have lignin thickenings

(a) Options (i) and (ii) (b) Options (ii) and (iii)

(c) Options (i) and (iii) (d) Options (i), (iii) and (iv)

Ans. (c) Options (i) and (iii)

Very Short Answer Type Questions

7. Why do meristematic tissues lack vacuoles?

Ans. Meristematic cells are actively dividing cell. They do not produce any waste material for storage. Hence, vacuoles are absent in meristematic cells.

8. What will happen if the apical meristem does not separate from the apex?

Ans. Apical meristem, present at the tip of root and shoot helps to increase the length of root and shoot. If it separates from the apex then growth of the plant will stop.

9. What is the common name for xylem and phloem?

Ans. Conducting tissue or vascular tissue.

10. Name the following:

(a) Thickening present in sclerenchyma cells.

(b) A component of phloem formed by end to end fusion of cells with perforated transverse wall.

Ans. (a) lignin (b) Sieve tube.

11. Name the regions of a plant in which parenchyma tissue is present.

Ans. Parenchyma is found universally in all the plants. It forms the major tissue of softer parts like the epidermis, cortex, pith and leaf mesophyll. It is also found in xylem and phloem.

12. What are the functions of sieve cells? How are they designed to carry out their functions?

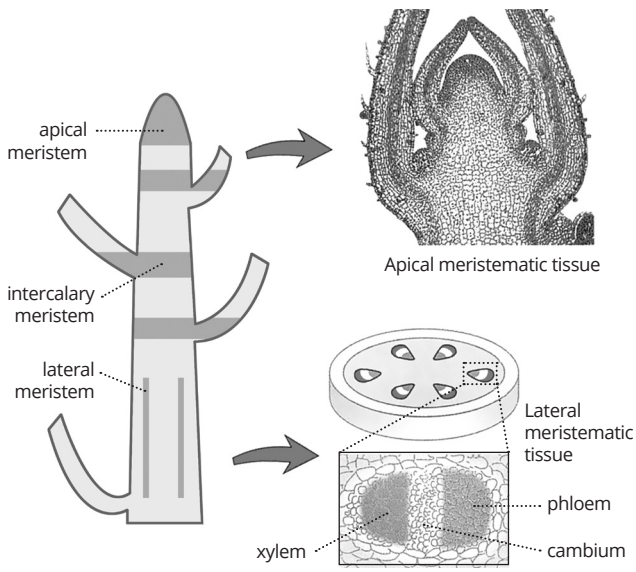
Ans. Sieve cells conduct food materials prepared in the leaves and greener young stems to all parts of the plant. They have pores through which nutrients flow from cell to cell.

13. Mention one major difference between cork and epidermis.

Ans. Epidermal cells cover the entire plant body during primary growth while cork cell cover the stem and root of the plant after the secondary growth of the plant.

14. Draw a neat labelled diagram showing the location of different types of meristems in a plant.

Ans.



Meristematic tissue

15. Differentiate between simple tissue and complex tissue in plants.

Ans. Simple tissues are made up of only one type of cell and are mainly responsible for storage and mechanical support while complex tissues are made up of more than one type of cells and are mainly responsible for transportation. Examples of simple tissue are parenchyma, collenchyma and sclerenchyma while that of complex tissues are xylem and phloem.

Short Answer Type Questions

16. How is the epidermis modified to perform various functions in the following?

(a) Desert plants (b) Roots

(c) Aerial parts of a plant

Ans. (a) In desert plants, outer walls of the epidermis are usually thick and covered with organic substances like cutin. The cutin is a chemical substance that is waterproof. The thick cutinized wall of epidermis greatly reduces loss of water by transpiration.

(b) The epidermal cells of the roots contain long hair-like structures called root hair. The root hair increase surface area for absorption of water and nutrients from soil.

(c) Epidermal cells of aerial parts of the plant secrete a waxy, water resistant layer on their outer surface. It protects them against loss of water, mechanical injury and any attack by pathogenic fungi.

17. Name three kinds of permanent tissues found in plants. Write one function of each.

Ans. Plant permanent tissues are group of cells which have lost the ability to divide. They get differentiated after their formation to perform specialized or particular functions. Permanent tissues may be living for example, parenchyma or dead for example sclerenchyma. Three types of permanent tissues are parenchyma, collenchyma and sclerenchyma.

Functions:

Parenchyma stores food material in the form of proteins, starch, oil and fats.

Collenchyma provides tensile strength to the plants.

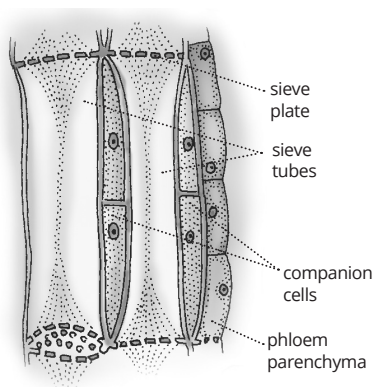
Sclerenchyma provides mechanical strength to the plant and its parts.

18. (a) Show a diagrammatic representation of a longitudinal section of phloem tissue.

(b) State the role of cambium in plants.

(c) Write two differences between meristematic and permanent issues.

Ans. (a)



Phloem tissue

(b) Cambium or lateral meristem is responsible for increase in the girth of the roots and stem. These tissues are also responsible for growth in thickness by the addition of secondary tissue and this phenomenon is called secondary growth.

(c)

Meristematic Tissue	Permanent Tissue
It is a group of young cells that have capacity of active cell division.	It is a group of cells in which growth has either stopped completely or for the time being.
They are composed of living cells and are very active.	These are formed by cells that have lost the capacity to divide. These cells may be dead or alive.

Long Answer Type Questions

19. (a) Give a brief account on the types of cells in phloem and their functions.

(b) With respect to conduction, state the main differences between xylem and phloem.

Ans. (a) Phloem is the chief food-conducting tissue of plants. There are five types of phloem elements – sieve cells, sieve tubes, companion cells, phloem parenchyma and phloem fibres. Except phloem fibres which are dead, all other members of the phloem tissue are living.

Sieve cells, unlike the more specialized sieve tubes, lack the sieve plates. They have pores through which nutrients flow from cell to cell. The sieve tubes of phloem are elongated tubular conducting channels, which are placed end to end. They have perforated walls. They conduct food materials prepared in the leaves and greener young stems to all parts of the plant.

Companion cells lie on the sides of sieve tubes and are closely associated with them. They help sieve tubes in conduction of food materials.

Phloem parenchyma are ordinary living parenchyma cells associated with phloem. They store food.

Phloem fibres are dead sclerenchyma fibres. They provide mechanical strength. The textile fibres of flax, hemp and jute are phloem fibres.

(b)

Xylem	Phloem
It transports water and minerals from roots to all parts of the plant.	It transports prepared food from leaves to the other parts of the plant.
Transport through xylem is unidirectional.	Transport through phloem is bidirectional.

20. (a) What is the nature of cell wall in collenchymal cells?

(b) State two functions of collenchyma tissues.

(c) Draw a labelled diagram of collenchyma tissue as seen in longitudinal section.

(d) How is collenchyma different from sclerenchyma?

Ans. (a) The cells of collenchyma have cellulose thickening at the corners.

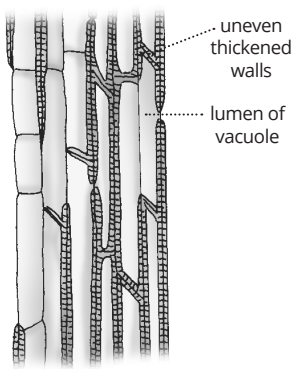
(b) Functions of collenchyma

It provides tensile strength and rigidity to the plants due to thickening of the walls.

Collenchyma also provides elasticity to the plant organs. The flexibility in plants is due to collenchyma tissues. It provides bending of leaves and stems without breaking them.

Collenchyma being alive also stores food.

(c)



Collenchyma

(d)

Collenchyma	Sclerenchyma
The cells of this tissue are living.	The cells of this tissue are dead.
The cell wall is thick due to deposition of pectin.	The cell wall is thick due to deposition of lignin.

Check Your Progress 2

(Page 52)

Multiple-Choice Questions

1. Muscles immuned to fatigue are

(a) striated. (b) unstriated.
(c) cardiac. (d) eye muscles.

Ans. (c) cardiac.

2. Presence of an extracellular basement membrane is a characteristic of

(a) epithelial tissue. (b) connective tissue.
(c) nervous tissue. (d) muscular tissue.

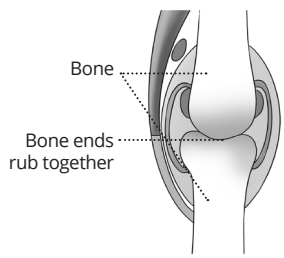
Ans. (a) epithelial tissue.

3. Haversian canal is found in

(a) lymph. (b) mammalian cartilage.
(c) mammalian bone. (d) blood.

Ans. (c) mammalian bone.

4. A student observes an image of the knee bones of a person who is suffering from a condition called arthritis due to inflammation of joints.



Which connective tissue can likely be added between the bones to ease the movement of joints?

(a) Blood, as it contains proteins
(b) Areolar tissue, as it repairs the tissue
(c) Ligament, as it joins the two bones easily
(d) Cartilage, as it smoothens surface of the bones

Ans. (d) Cartilage, as it smoothens surface of the bones

5. Reema's biology class teacher asked her to write three characteristic features about ligament tissue. She wrote three points.

(i) Ligaments are fibrous connective tissue.
(ii) They connect muscles with bones.
(iii) They contain yellow elastic fibres

Select the correct answers from the above.

(a) Options (i) and (iii). (b) Options (i) and (ii)
(c) Options (ii) and (iii). (d) All of these

Ans. (a) Options (i) and (iii).

Very Short Answer Type Questions

6. Name

(a) the tissue that makes the brain.

(b) zig-zag thickening in cardiac muscles.

Ans. (a) nervous tissue

(b) intercalated disc

7. What is basement membrane? Where is it located?

Ans. Basement membrane is an extracellular fibrous membrane which separates epithelial tissue from the underlying connective tissues.

It is present below the epithelial layer.

8. Name the bone cell. What makes bone strong and non-flexible?

Ans. Osteocytes

Bones cells are embedded in hard matrix composed of calcium and phosphorus which makes it strong and non flexible.

9. What enables the animals to respond to stimulus?

Ans. Nerve cells or neurons.

10. Name the type of tissue present in

(a) respiratory tract. (b) skin.

Ans. (a) ciliated epithelium

(b) stratified squamous epithelium

11. Name the different types of WBCs. What is the composition of blood plasma?

Ans. Different types of WBCs are eosinophil, basophil, neutrophil, lymphocyte and monocyte.

Plasma contains water, inorganic salts, organic substances like blood proteins and hormones.

12. Distinguish between adipose tissue and areolar tissue.

Ans.

Adipose Tissue	Areolar Tissue
It is found below the skin and around internal organs.	It is found below the skin and muscles and around blood vessels and nerves.
It stores fat which acts as an insulator. It also acts as a cushion for shock absorption.	Areolar connective tissue fills the space inside the organs and supports internal organs. It also helps in repair of tissues.

13. Write two functions of adipose tissue.

Ans. Adipose tissue stores fat which acts as an insulator. It also acts as a cushion for shock absorption.

14. Describe the structure and function of the tissue found in the iris of the eyes.

Ans. Involutary or unstriated muscles are found in the iris of eyes. These muscle cells are spindle-shaped and are arranged in bundles. They have only one nucleus. They do not contain any striations or bands. Their movement is not under our will and hence we cannot start or stop their action.

Short Answer Type Questions

15. Write six functions of epithelial tissue.

Ans. Epithelial tissue performs the following functions:

Protection: Epithelial tissue protects the underlying tissues from mechanical injury, entry of germs, drying up and harmful chemicals.

Absorption: Epithelial lining of intestine absorbs water and nutrients from digested food.

Excretion: Epithelial lining of nephron in kidneys helps in excretion of nitrogenous waste.

Secretion: Epithelial lining of digestive glands and endocrine glands secrete useful secretions.

Exchange of Materials: The cells of various epithelia regulate the exchange of materials between the body and the external environment and also between different parts of the body. Epithelial lining of alveoli of lungs brings about exchange of oxygen and carbon dioxide between blood and inhaled air.

Barrier: It acts as a selective barrier to anything entering or leaving the organ.

16. What are cartilage cells known as? What is the nature of matrix and what is its composition? Where is cartilage located in our body?

Ans. Chondrocytes.

Its matrix is elastic composed of proteins and sugar.

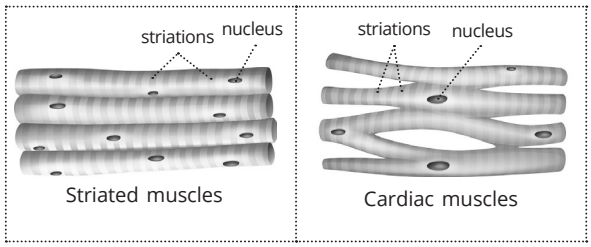
In human beings, cartilage is present in the larynx, trachea, at the end of bones, nose and in between ribs and sternum.

Long Answer Type Questions

17. Write two differences between the muscles present in the heart and the limbs of man. Also draw labeled diagrams of these two kinds of muscles.

Ans. Muscles present in the heart is cardiac muscles and that in limbs are voluntary or striated muscles.

Striated Muscles	Cardiac Muscles
They have cylindrical, unbranched and multinucleated cells.	These muscle cells are cylindrical, branched and uninucleated.
These are voluntary muscles which soon gets fatigue.	These are involuntary muscles which rhythmically contract and relax throughout life and never get fatigue.



18. (a) Describe the structure, functions and location of nervous tissue.

(b) Draw a labelled diagram of a neuron. Write the functions of any two parts.

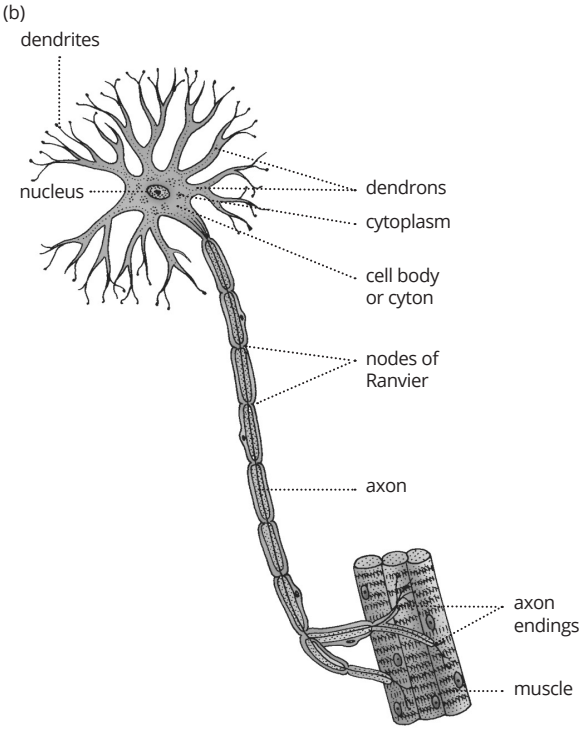
Ans. (a) A neuron or nerve cell is the structural and functional unit of the nervous system.

Structure: A typical nerve cell consists of cell body or cyton, axon, dendrons and dendrites. Cell body or cyton is star-shaped and has a prominent nucleus and cytoplasm. From the cell body arise several branches. One of the branches grows very large in comparison to others. This branch is called axon. The axon terminates into axon endings. The other small branches given out by cyton are called dendrons, which further divide to form dendrites.

Function: They are specialized to respond to stimuli and transmit stimulus very rapidly from one part to another within the body.

Location: The brain, spinal cord and nerves are composed of nervous tissue.

(b)



A nerve cell or neuron

The dendrites receive impulses and axon takes the impulses away from the cell body or cyton.

Higher Order Thinking Skills (HOTS) Questions

(Page 54)

1. What will happen, if

(a) the skin epithelium is not stratified?

(b) the stratified squamous epithelium lines the blood vessels?

Ans. (a) If the skin is not stratified it would be prone to wear and tear and protection to innermost layers would be less.

(b) If stratified epithelium lines the blood vessels, the exchange of molecules and gases across the blood vessel through diffusion would not be possible. The cell will not get oxygen and glucose or remove waste material like carbon dioxide.

2. The functional combination of nerve and muscle tissue is fundamental to most animals. Comment.

Ans. The functional combination of nerve and muscle tissue enables animal to move rapidly in response to stimuli. Therefore, this combination is fundamental to most animals.

3. What will happen if a cell is not properly organized in tissue?

Ans. In multicellular organisms, similar cells which are specialised in a particular function group together to form tissues. If cells are not organized into tissue then highly organized and specialised processes like body movement and locomotion, transport of substances, exchange of material, absorption, support, protection etc. in an organism will not function properly. There will be no coordination in the functioning of the cells and body.

4. What will happen, if

(a) cilia is not present in the respiratory tract?

(b) lymph is not returned to blood?

Ans. (a) If cilia would not be present in the respiratory tract, the mucus and unwanted dust particles would not be pushed forward and removed from the respiratory tract.

(b) If lymph is not returned to blood, fluid balance in the body would not be maintained and the tissues will swell up at the blocked area causing severe pain.

5. Sieve tube loses its nucleus in the mature state but still stays alive. Explain how.

Ans. Sieve tube stays alive despite losing its nucleus in mature state because it is in close association with

companion cell through protoplasmic connection. Companion cells have prominent nucleus and dense cytoplasm and it supports sieve tube through proplasmic connection throughout its lifetime.

6. We can control some of the actions of our body, but some are not in our control. Comment.

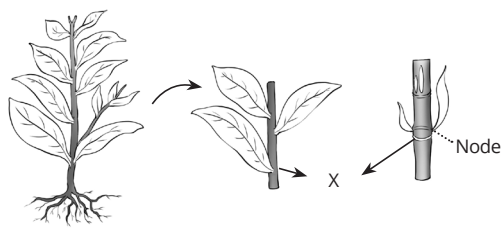
Ans. We can only control the voluntary actions of our body like movement of limbs. Involuntary actions of our body like heart beat, are not in our control.

Self-Assessment

(Page 54)

Multiple-Choice Questions

1. The image shows the stem of a plant. Which type of meristematic tissue is present at the labelled part 'X'?



(a) Apical meristem
(b) Intercalary meristem
(c) Lateral meristem
(d) Both apical and lateral meristem

Ans. (b) Intercalary meristem

2. Cork is impervious to water because it contains
(a) lignin. (b) suberin.
(c) pectin. (d) fibres.

Ans. (b) suberin.

3. The number of nuclei present in striated muscle is
(a) one. (b) many.
(c) two. (d) none.

Ans. (b) many.

4. Contractile proteins are found in
(a) bones. (b) blood.
(c) muscles. (d) cartilage.

Ans. (c) muscles.

5. Which tissues store fat in our body?
(a) Cuboidal epithelium (b) Cartilage
(c) Bone (d) Adipose tissue

Ans. (d) Adipose tissue

Assertion–Reason Type Questions

For question numbers 6 to 13, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both A and R are true and R is the correct explanation of the assertion.
(b) Both A and R are true but R is not the correct explanation of the assertion.
(c) A is true but R is false.
(d) A is false but R is true.

6. **Assertion:** Parenchyma and collenchyma are examples of simple permanent tissues.
Reason: Xylem and phloem are examples of simple tissues.

Ans. (c)

7. **Assertion:** Ligaments connect bone to bone.
Reason: Tendons connect bone to muscle.

Ans. (b)

8. **Assertion:** Bone, cartilage and blood are examples of connective tissues.
Reason: Matrix of a bone is solid and that of a cartilage is semi-solid.

Ans. (b)

9. **Assertion:** Wall of blood capillaries are single cell thick.
Reason: Thin walls facilitate exchange of materials.

Ans. (a)

10. **Assertion:** Heart is made up of cardiac muscles.
Reason: Cardiac muscles are also found in the alimentary canal.

Ans. (c)

11. **Assertion:** Epithelial tissue can be simple or stratified.
Reason: The outer and inner lining of animal system is made up of epithelial tissue.

Ans. (b)

12. **Assertion:** Meristematic cells can divide but cannot differentiate.
Reason: Cells of permanent tissues are differentiated but cannot divide.

Ans. (d)

13. **Assertion:** Desert plants have thick waxy cuticle.
Reason: Thick waxy coating over epidermal layer reduces transpiration.

Ans. (a)

Source-based/Case-based/Passage-based/ Integrated assessment questions

Answer the questions on the basis of your understanding of the following passages and the related studied concepts.

14. Anjali was playing basketball with her friends. She fell on the ground and got twisted ankle. The portion of her leg swelled and was paining badly. Her parents took her to the doctor who advised them to get an X-ray done. After the X-ray report the doctor concluded that there is a ligament injury and bone fracture. The leg was put in plaster for four weeks.

I. (a) Why did the doctor recommended an X-ray?

(b) What was the need for a plaster?

(c) (i) Differentiate between tendon and ligament.

OR

(ii) Why women over 40 should take calcium supplements on a regular basis?

Ans. (a) X-ray is used in radiography to help detect the fracture or injury.

(b) Plasters allow the broken or injured parts to heal faster by holding them in place.

(c) (i) Tendons are dense fibrous connective tissues with limited flexibility and join muscles with bones while ligaments contain elastic fibres and connect one bone with the other. They permit bending and rotational movement of bones over joints.

OR

(ii) Elderly women requires more calcium because of increased risk of osteoporosis.

II. (a) The doctor recommended an X-ray to

(i) produce picture of the inside.

(ii) evaluate the injury.

(iii) diagnose the bone fracture.

(iv) all of these.

Ans. (iv) all of these.

(b) Ligaments are elastic in nature due to the presence of

(i) white collagen fibres.

(ii) yellow fibres.

(iii) osteocytes.

(iv) calcium.

Ans. (ii) yellow fibres.

(c) Select the correct difference between tendon and ligament.

(i) Tendon joins muscles with muscles whereas ligament joins muscles with bones.

(ii) Tendon joins one bone with other whereas ligament joins muscles with muscles.

(iii) Tendon joins muscles with bones whereas ligament joins one bone with the other.

(iv) Tendon joins one bone with other whereas ligament joins muscles with bones.

Ans. (iii) Tendon joins muscles with bones whereas ligament joins one bone with the other.

(d) Women over 40 are advised to take calcium supplements on a regular basis as it is the major constituent of

(i) tendons. (ii) cartilage.

(iii) blood. (iv) bones.

Ans. (iv) bones.

(e) A thin section of connective tissue 'X' is displayed in a practical class for identification.

X

Students correctly identified the tissue 'X' as

(i) bone. (ii) ligament.

(iii) tendon. (iv) cartilage.

Ans. (i) bone.

15. Rohan's brother studies in grade 4 and his teacher taught them that new plants can be grown from many parts of the plant like stem, leaf, bulbs etc. He wanted to see it for himself and took a few pots and started putting leaves, stem cuttings and roots. That is when Rohan explained his brother that it is shown by specific plants and that the plant part should contain a bud to give rise to a new plant.

I. (a) Give an example of plant which forms new plants from bulb and leaf.

(b) What type of tissue is found in a bud?

(c) (i) Name the process during which new plants are formed from parts other than seeds.

OR

(ii) What are the types of meristematic tissue?

Ans. (a) From bulb: Onion

From leaves: *Bryophyllum*

(b) Apical meristematic tissue is found in buds.

(c) (i) Vegetative propagation

OR

(ii) Types of meristematic tissue are apical, intercalary and lateral.

II. (a) The type of tissue, responsible for growth, found in a vegetative bud is

(i) parenchyma. (ii) collenchyma.

(iii) meristem. (iv) sclerenchyma.

Ans. (iii) meristem.

(b) Meristematic tissues are characterized by
  (i) undifferentiated living cells with dense cytoplasm.
  (ii) differentiated living cells with thick wall.
  (iii) highly active living cells with very little cytoplasm.
  (iv) differentiated dead cells.

Ans. (i) undifferentiated living cells with dense cytoplasm.

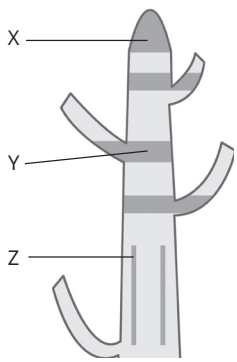
(c) Which of the following is a meristematic tissue?
  (i) Growing tips of stem
  (ii) Seed coat
  (iii) Bark
  (iv) Jute fibre

Ans. (i) Growing tips of stem

(d) Lateral meristem in plant, is responsible for
  (i) increase in length.
  (ii) increase in girth.
  (iii) conduction of water.
  (iv) conduction of food.

Ans. (ii) increase in girth.

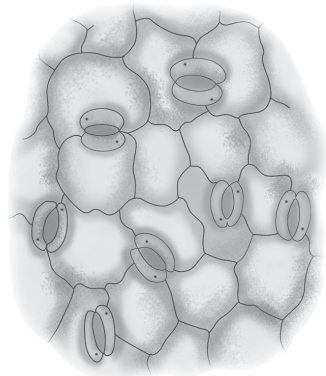
(e) Identify 'X' , 'Y' and 'Z' from the given figure and select the correct option.



  (i) 'X' gives rise to secondary permanent tissue.
  (ii) 'Y' is only found in dicots.
  (iii) 'Z' is responsible for secondary growth in plants.
  (iv) 'Y' is responsible for increase in thickness in plants.

Ans. (iii) 'Z' is responsible for secondary growth in plants.

16. Ruhi examines a leaf peel under microscope in her biology practical class. It is taken from a freshly plucked *Rhoeo* leaf. The leaf peel, she examines, is called the epidermal layer or epidermis. Epidermis is consisting of flat shaped cells without intercellular spaces. The epidermis of the leaf contains numerous small pores. Each pore is enclosed by two kidney-shaped cells. These kidney-shaped cells contain chloroplasts and nucleus. They control the opening and closing of the pore.



I. (a) What are the functions of epidermis?

(b) What are the names of epidermal pores and the kidney-shaped cells?

(c) (i) The kidney-shaped cells control those epidermal pore sizes. Explain the process.

OR

(ii) Draw the labelled diagram of stoma.

Ans. (a) Epidermis is the outermost protective layer of plant organs. Epidermis performs the function of protection in the following ways:

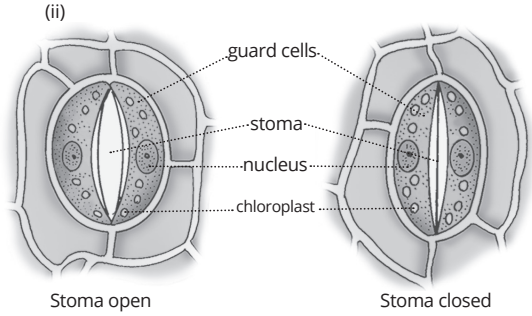
- It protects internal tissues against mechanical injury, parasitic fungi, bacteria and cold or heat.
- Thick cuticle, wax, epidermal hair and multiple epidermis reduce loss of water from internal tissues.
- Epidermal cells of roots have hair that greatly increase the surface area for the absorption of water and nutrients.

(b) The epidermal pores on leaves are called stomata. Each stoma is enclosed by two kidney-shaped cells called guard cells.

(c) (i) The guard cells control the opening and closing of stomatal pores. When water enters the guard cells, they become turgid and swell. As a result, they become curved and stomata open. When the guard cells lose water, they shrink and become straight. As a result, the stomatal pores close.

OR

(ii)



Structure of stomata

II. (a) Epidermal tissue consists of

(i) epidermal cells. (ii) stomata.

(iii) trichomes. (iv) all of these.

Ans. (iv) all of these.

(b) The kidney-shaped cells surrounding the pore are called

(i) stomata. (ii) guard cells.

(iii) subsidiary cells. (iv) palisade cells.

Ans. (ii) guard cells

(c) Epidermis in the examined leaf is

(i) single layered. (ii) double layered.

(iii) triple layered. (iv) multilayered.

Ans. (i) single layered

(d) The studied leaf epidermis does not possess

(i) cuticle. (ii) stomata.

(iii) guard cells. (iv) root hairs.

Ans. (i) cuticle

(e) The inner wall of guard cell is

(i) thin.

(ii) adjacent to stomatal aperture.

(iii) elastic.

(iv) all of these.

Ans. (ii) adjacent to stomatal aperture

Very Short Answer Type Questions

17. Name the tissue found in soft parts of the plant like cortex and pith.

Ans. Parenchyma

18. Why are skeletal muscles known as striated muscle?

Ans. Due to presence of alternate light and dark bands.

19. What do you mean by differentiation of cell?

Ans. Differentiation is the process by which cell loses its ability to divide and take up a permanent shape, size and function.

20. Deposition of which substance makes cork so hard?

Ans. Suberin

21. What is an apical meristem? Where is it located? State its functions.

Ans. Apical meristem is a type of meristematic tissue that is located at the tips of shoot and roots of the plant. It consists of a group of cells which gives rise to primary permanent tissues that together constitute the primary body of the plant. Due to the growth of apical meristems, there is increase in the length of stems and roots.

22. A horse and a mango tree, both are complex living organisms with specialized yet different tissue systems to perform the basic life processes. Give two reasons for possessing different tissues to perform similar functions.

Ans. The tissues found in horse are different from those found in mango tree. Plants are stationary and most of the tissues in plants are dead which mainly provides mechanical support while animals are motile and contain living tissues. Growth in plants is limited to certain region while it is uniform in animals.

23. Differentiate between meristematic tissue and permanent tissue.

Ans.

Meristematic Tissue	Permanent Tissue
It is a group of young cells that have capacity of active cell division.	It is a group of cells in which growth has either stopped completely or for the time being.
These are composed of living cells and are very active.	These are formed by cells that have lost the capacity to divide. These cells may be dead or alive.

24. Write two differences between aerenchyma and chlorenchyma.

Ans.

Chlorenchyma	Aerenchyma
These are parenchyma tissue containing chlorophyll.	These are parenchyma tissue containing air cavities.
Found in leaves of green plants.	Found in aquatic plants.
Helps in photosynthesis.	Provides buoyancy to aquatic plants and helps them float in water.

Short Answer Type Questions

25. (a) What are neurons? Where are they found in the body? What functions do they perform in the body of an organism?

(b) Differentiate between axon and dendrite.

Ans. (a) A neuron or nerve cell is the structural and functional unit of the nervous system.

They are found in the brain, spinal cord and nerves.

They are specialized to respond to stimuli and transmit stimulus very rapidly from one part to another within the body.

(b) Axon is the long branch arising from the cell body while dendrites are short branches arising from the cell body. The dendrites receive impulses and axon takes the impulses away from the cell body or cyton.

26. (a) What is the function of tissues in multicellular organisms?

(b) What is a vascular bundle? Name the tissues forming vascular bundles.

(c) Where are companion cells located in plants? Mention their functions.

Ans. (a) In multicellular organisms, there is division of labour and the specialized cells are dependent on one another for their activities. Cells performing a specific function and having a common origin are grouped together to form tissue. Various tissues of an organism work in coordination with each other in order to perform various functions.

(b) Vascular bundles are the conducting tissues in vascular plants. It is composed of xylem and phloem.

(c) Companion cells lie on the sides of sieve tubes and are closely associated with them. They help sieve tubes in conduction of food materials.

Long Answer Type Questions

27. Identify the kind of tissue and write their characteristic feature:

(a) Connects bones to bones

(b) Transports water and minerals in plants

(c) Forms inner lining of alveoli

(d) Stores fat in our body

(e) Allows easy bending in stem of plants without breaking

Ans. (a) Ligaments

Ligaments contain very little matrix with many closely-packed yellow or elastic fibres.

(b) Xylem

Xylem is a complex tissue composed of four types of cells – xylem vessels, tracheids, xylem fibres and xylem parenchyma.The cells are thick-walled and many of them are dead cells. As a conducting strand, xylem forms a continuous channel through the roots, stem, leaves and other aerial parts.

(c) Simple squamous epithelium

It is made up of extremely thin and single layer of simple flat cells that form a delicate lining.

(d) Adipose tissue

It is an aggregation of fat cells called adipocytes. The cells of adipose tissues are filled with fat globules.

(e) Collenchyma

The cells of collenchyma are living, somewhat elongated with cellulose thickening at the corners. There is very little intercellular space between cells of collenchyma tissue due to irregularly thickened walls. Thickening is caused due to uneven deposition of cellulose and pectin, generally at the corners.

28. Give a brief account on different types of connective tissues.

Ans. There are following types of connective tissues in the human body

Fluid connective tissue – blood and lymph

Skeletal tissue – bone and cartilage

Fibrous connective tissue – tendons and ligaments

Areolar connective tissue

Adipose tissue

Fluid Connective Tissue – Blood and Lymph

Both blood and lymph are fluid connective tissues. They help in transportation of oxygen, vitamins, nutrients and hormones to various cells and tissues and also remove CO_2 and other waste from the cells. They have a fluid matrix.

Blood consists of blood corpuscles suspended in blood plasma.

Lymph is a transparent, light yellow fluid. It contains white blood corpuscles called leucocytes. Lymph is present in the intercellular spaces, hence it is also called tissue fluid.

Skeletal Tissue – Bone and Cartilage

Bone is a rigid and hard skeletal connective tissue. It forms the skeletal framework that supports the body. Its matrix is hard. The bone cells are called osteocytes. Bone cells are embedded in a hard matrix which is composed of calcium and phosphorus compounds.

Cartilage is a compact, relatively soft and elastic skeletal tissue. It consists of elastic matrix having protein, collagen fibres, sugar and is slightly hardened by calcium. Cartilage has widely spaced out cells. In human beings, cartilage is present in the larynx, trachea, at the end of bones, nose and in between ribs and sternum.

Fibrous Connective Tissue – Tendons and Ligaments

Tendons are dense fibrous connective tissues with great strength but limited flexibility. Its matrix contains unbranched white collagen fibres. Tendons join muscles with bones.

Ligaments contain very little matrix with many closely-packed yellow or elastic fibres. Due to the presence of yellow elastic fibres in matrix, they are very elastic and connect one bone with the other. They have appreciable strength and permit bending and rotational movement of bones over joints.

Areolar Connective Tissue

In this tissue, fibres are loosely arranged in a meshwork. It is located between skin and muscles, around blood vessels and nerves and in the bone marrow. Areolar connective tissue binds the skin with muscles and attaches blood vessels and nerves to the surrounding tissues. It fills the space inside the organs and supports internal organs. It also helps in repair of tissues. Overall, it acts as a supporting and packing tissue between organs lying in the body cavity.

Adipose Tissue

It is an aggregation of fat cells called adipocytes. It is found below the skin and between internal organs, around kidneys and in yellow bone marrow. The cells of adipose tissues are filled with fat globules. It stores fat which acts as an insulator. It also acts as a cushion for shock absorption.

Let's Compete

(Page 57)

Multiple-Choice Questions

1. Aerenchyma occurs in

(a) mesophytes. (b) xerophytes.

(c) hydrophytes. (d) sciophytes.

Ans. (c) hydrophytes.

2. Which one of the following is dead and yet provide mechanical strength?

(a) Sieve tube (b) Companion cells

(c) Phloem fibres (d) Phloem parenchyma

Ans. (c) Phloem fibres

3. The tissue that helps in the sideways conduction of water in plants is

(a) collenchyma. (b) xylem vessels.

(c) parenchyma. (d) xylem parenchyma.

Ans. (d) xylem parenchyma.

4. If the tip of sugarcane plant is removed from the field, even then it keeps on growing in length. It is due to the presence of

(a) cambium. (b) apical meristem.

(c) lateral meristem. (d) intercalary meristem.

Ans. (d) intercalary meristem.

5. In desert plants, rate of water loss gets reduced due to the presence of

(a) stomata. (b) lignin.

(c) suberin. (d) cuticle.

Ans. (d) cuticle.

6. Cartilage are made up of cells called

(a) osteocytes. (b) chondrocytes.

(c) canaliculi. (d) Harvesian canal.

Ans. (b) chondrocytes.

7. Sarcolemma is the outer membrane of

(a) cartilage. (b) nerve fibre.

(c) muscle fibre. (d) collagen fibre.

Ans. (c) muscle fibre.

8. The characteristics of cardiac muscles are

(a) similar to those of striated muscles.

(b) similar to those of nonstriated muscles.

(c) a mixture of striated and nonstriated muscles.

(d) unique.

Ans. (d) unique.

9. Nucleus is absent in

(a) sieve tube.

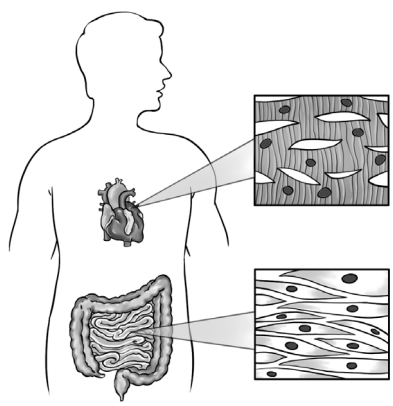
(b) companion cell.

(c) phloem parenchyma.

(d) collenchyma.

Ans. (a) sieve tube.

10. The image shows the structure of two types of muscles that are present in two different locations in the human body.



Based on their location what can be concluded about their function?

(a) Both the muscles protect body organs.

(b) Both the muscles show voluntary movements.

(c) Both the muscles help in movement of body.

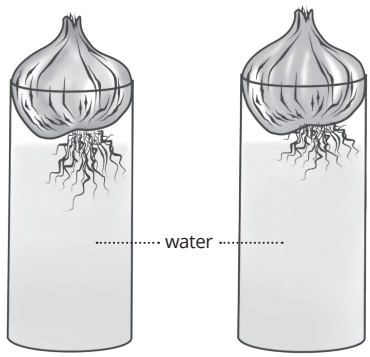
(d) Both the muscles show involuntary movement.

Ans. (d) Both the muscles show involuntary movement.

Life Skills

(Page 57)

1. Rajesh and Ayush both are bright students studying in Class X. Once an experiment on demonstrating a vital process was given to the class. In this experiment, two jars, A and B, having onion bulbs with root tips dipping in water were given as shown in the figure. However, after cutting the root tip of the onion bulb in jar B, Rajesh disturbed the experimental set-up of Ayush and replaced water with acetic acid in jar B.



(a) Do you consider the action of Rajesh appropriate? Why?

(b) Will Ayush and Rajesh get the same result? Justify your answer.

Ans. (a) In my view, the action of Rajesh is considered inappropriate as he tried to disturb Ayush's experimental set-up. Ayush result might have been altered due to Rajesh action.

(b) Yes, they will get the same result as root tip of the onion bulb have been cut in jar B. In the absence of apical meristem which is present at root tip, the growth of root will stop irrespective of whether it is dipped in water or acetic acid.

2. Richa tried to bend the stem of a plant without breaking it and she was able to do it.

(a) Name the tissue in the plant which made it possible.

(b) State two characteristics of this tissue.

(c) What values are shown by Richa?

Ans. (a) Collenchyma.

(b) The cells of collenchyma are living, somewhat elongated with cellulose thickening at the corners. There is very little intercellular space between cells of collenchyma tissue due to irregularly thickened walls. Thickening is caused due to uneven deposition of cellulose and pectin, generally at the corners.

(c) The values shown by Richa are curiosity and love for nature.

3. Sunil while playing football with his friends suddenly got injured. His friends took him to the hospital, where the doctor told the boys that Sunil had sprained his leg and advised bed rest. The doctor also applied ice on the sprained area. Every afternoon, his friends visited him to enquire about his health.

(a) What happens during a sprain?

(b) Why did the doctor apply ice to the affected area?

(c) What values are shown by his friends?

Ans. (a) Sprain happens due to overstretching or tearing of ligaments.

(b) Doctor adviced to apply ice on affected area to stop swelling.

(c) The values shown by his friends are caring and helpful nature.

12

Improvement in Food Resources

Checkpoint (Page 60)

1. Differentiate between kharif and rabi crops.

Ans.

Kharif crop	Rabi crop
These crops are sown on the onset of monsoon (June).	These crops are sown on the onset on winter (November).
These crops are harvested in winter (October).	These crops are harvested in summer (April).
These crops require more water.	These crops require moderate water.
Examples: Jowar, bajra, paddy, maize, cotton.	Examples: Wheat, gram, pea, linseed, mustard.

2. Give two examples each of kharif and rabi crop.

Ans. Kharif crop: paddy, maize; Rabi crop: Wheat, gram.

3. Explain how fertilisers are different from manures.

Ans.

Fertiliser	Manure
It is a salt or an inorganic compound manufactured with chemicals.	It is a natural substance obtained by the decomposition of animal wastes and plant residues.
It is nutrient specific and provides specific nutrient to the soil.	It is not nutrient specific and removes the general deficiency of soil.
It is easily soluble in water and is readily absorbed by plants.	It is not easily soluble in water.
It does not provide humus to the soil.	It provides humus to the soil.
It is prepared in the factories.	It is prepared in the fields or rural homes.
It is compact and concentrated, so it is easy to store and transport.	It is voluminous and bulky, so it is not convenient to store or transport.

4. What is irrigation? State two methods of irrigation which conserve water.

Ans. The process of supplying water to the crop is called irrigation. Two methods of irrigation which conserve water are: Sprinkler system and Drip system.

5. What are weeds? Name few weeds. How can we control them?

Ans. The unwanted wild plants, which grow with crop plants in the cultivated field, are called weeds. Few common weeds are *Amaranthus* (*chaulai*), *Xanthium* (*gokhroo*), and *Parthenium* (*gajar ghas*). We can control them by uprooting them manually using a *khurpi* or by using chemicals like weedicides which kills the weeds.

6. Differentiate between mixed cropping and crop rotation.

Ans. Mixed cropping involves growing two crops together at the same time whereas crop rotation involves growing two crops alternately on the same land.

7. Name the disease caused due to deficiency of

(a) proteins in children.

(b) vitamin C.

(c) iodine.

Ans. (a) Kwashiorkor
(b) Scurvy
(c) Goitre

8. What precautions should be taken while storing the crop grains?

Ans. The crop grains should be cleaned, sun dried and then dried in the shade before storing them in the containers, gunny bags or grain-silos.

9. Define animal husbandry.

Ans. The branch of agriculture related to the scientific management of animal livestock is known as animal husbandry.

Check Your Progress 1

(Page 77)

Multiple-Choice Questions

1. Which of the following is not a macronutrient?
(a) Potassium (b) Calcium
(c) Nitrogen (d) Manganese

Ans. (d) Manganese

2. Growing of wheat and groundnut on the same field is called
(a) intercropping.
(b) integrated farming practice.
(c) mixed cropping.
(d) crop rotation.

Ans. (c) mixed cropping.

3. Which of the following is not used as a green manure?
(a) Sunhemp (b) Berseem
(c) *Xanthium* (d) Linseed

Ans. (c) *Xanthium*

4. Which of the following essential plant nutrients is supplied by soil?
(a) Hydrogen (b) Carbon
(c) Phosphorus (d) Oxygen

Ans. (c) Phosphorus

5. A farmer grew mustard seeds in his field. The production occurred in high amount, so he stored half of the mustard seeds for next year. But after a few months he discovered that the seeds were damaged. What do you think is the probable reason for the damage?
(a) Cold temperature of the storage place
(b) Dry air in the storage place
(c) Inappropriate moisture content in the foodgrains
(d) All of these

Ans. (c) Inappropriate moisture content in the foodgrains

6. Leguminous crops are suggested to grow in between cereal crops. Which of the following option/options can be the reason?
(i) To restore the nitrogen requirement of the soil.
(ii) To optimum utilization of natural resources.
(iii) To use the same fertilizer for all crops.
(iv) To improve soil fertility.
(a) Option (i) and (iii) (b) Option (ii) and (iv)
(c) Option (i), (ii) and (iii) (d) Option (i) and (iv)

Ans. (d) Option (i) and (iv)

Very Short Answer Type Questions

7. What is hybridization?

Ans. Hybridization is the process of crossing two genetically dissimilar (different) plants to obtain a progeny with the desired traits. This crossing may be intervarietal, interspecific or intergeneric.

8. Define organic farming.

Ans. A system of farming which is used to produce food and fibre with minimal or no use of chemicals and with the maximum use of bio-agents and organic manures, known as organic farming.

9. State one importance of photoperiod in agriculture.

Ans. Photoperiod plays a key role in flowering of plants.

10. Define mixed cropping.

Ans. Growing two or more crops simultaneously on the same piece of land is known as mixed cropping.

11. What is the advantage of selecting seed of crop with wider adaptability for agriculture?

Ans. Improved varieties having wider adaptability would help in stabilizing the crop production under different regions and environmental conditions. Thus, single variety can be grown under different climatic conditions in different areas.

12. What are macronutrients? Give examples.

Ans. Macronutrients are those elements which are utilized by plants in relatively large quantities.

These are nitrogen, phosphorus, potassium, calcium, magnesium and sulphur.

13. What is genetic manipulation? How is it useful in agricultural practices?

Ans. In genetic manipulation technique, a gene that would provide the desired characteristics is

introduced in the plant. As a result, genetically modified crops are produced.

It helps in improving crop variety. It also improves the quality and yield of crops.

It helps in obtaining desirable agronomic characters like dwarfness in cereals and tallness and profuse branching in fodder crops. It ensures food security and helps to develop insect resistant crops.

14. Name some bioagents used as (a) biopesticides and (b) biofertiliser.

Ans. Bacteria (*Bacillus thuringiensis),* fungi, viruses, insects, nematodes, etc.

Biofertiliser: Blue green algae (*Nostoc, Anabaena*), Bacteria (*Rhizobium, Azotobacter*), etc.

15. Differentiate between manure and fertiliser?

Ans.

Fertiliser	Manure
It is a salt or an inorganic compound manufactured with chemicals.	It is a natural substance obtained by the decomposition of animal wastes and plant residues.
It is nutrient specific and provides specific nutrient to the soil.	It is not nutrient specific and removes the general deficiency of soil.
It is easily soluble in water and is readily absorbed by plants.	It is not easily soluble in water.
It does not provide humus to the soil.	It provides humus to the soil.
It is prepared in the factories.	It is prepared in the fields or rural homes.
It is compact and concentrated, so it is easy to store and transport.	It is voluminous and bulky, so it is not convenient to store or transport.

Short Answer Type Questions

16. What is farmyard manure? Differentiate between compost and vermicompost.

Ans. Farmyard manure is a type of manure prepared by using decomposed mixture of cattle excreta (dung) and urine along with the litter (generally straw) and leftover organic matter such as roughage or fodder. It is prepared by taking the above mentioned waste materials and storing them in a pit for decomposition by microbes till they form dark brown morphous substance, i.e. the manure.

The differences between compost and vermicompost are as follows:

Compost	Vermicompost
Compost is prepared from farm and town refuse like vegetable waste, livestock excreta (cow dung), animal refuse, sewage waste, eradicated weeds, crop stubble and straw on decomposition in a pit.	Composting by introducing earthworms in the pit of organic matter is called vermicomposting.
Compost takes about 3 to 6 months for its formation.	Vermicompost takes 1 to 2 months for its formation.

17. (a) The shorter the duration of crop, the more economical is the variety. Justify the statement.

(b) List two disadvantages of using fertilisers.

Ans. (a) The shorter duration of crops from sowing to harvesting is more economical for the farmer. This will reduce the cost of crop production. Using short duration crops, farmers can grow multiple rounds of crops in a year/season.

(b) Two disadvantages of using fertilisers are:

(i) These chemicals get washed away due to excessive irrigation and are thus not fully absorbed by the plants. These fertilisers reach rivers, lakes and other waterbodies polluting them and increasing the biological oxygen demand (BOD) of water. This causes harm to aquatic animals like fish and aquatic plants.

(ii) The continuous use of chemical fertilisers can cause drastic alterations in soil chemistry and affect the crop yield.

18. List three ways by which insect pests attack the plants.

Ans. Insect pests attack the plants in three ways:

(i) They cut roots, stem and leaves thereby destroying the crops.

(ii) They suck the cell sap from various parts of the plant.

(iii) They bore into the stem and fruits and eat them from inside.

Long Answer Type Questions

19. How are cultivation practices and crop yield related to weather? Explain five different factors for which variety improvement is carried out by farmers.

Ans. Cultivation practices and the crop yield are closely related to environmental conditions. Each crop grows in a specific environmental condition. Environment provides soil, water, temperature, humidity, day-length etc to the crops. Therefore, there are some crops which grows in rainy season (Kharif crops) while some others are grown during winter season (Rabi crops).

Some factors for which crop variety improvement is carried out are as follows:

- **High Yield:** This is done to increase the productivity of the crop per acre. This can be brought about by developing high-yielding varieties by cross-breeding and hybridisation.
- **Improved Quality:** Quality considerations of crop products vary from crop to crop. For example, baking quality is important in wheat flour, protein quality in pulses, oil quality in oil seeds and quality for preserving in fruits and vegetables.
- **Resistance to Undesirable Biotic and Abiotic Stresses:** New varieties developed as a result of varietal improvements should be resistant to biotic stresses like diseases, insects and other pests, and to abiotic stresses like drought, salinity, waterlogging, heat, cold and frost.
- **Change in Maturity Duration:** Maturity period of some long duration crops can be reduced, and then these crops can be used along with short duration crops in mixed cropping or multiple cropping. This will also reduce the cost of crop production. Uniform maturity will also make the harvesting process easy and it reduces the losses during harvesting.
- **Wider Adaptability to New Regions and Climatic Conditions:** Improved varieties should have wider adaptability which would help in stabilizing the crop production under different regions and environmental conditions.

20. (a) State three advantages of shorter duration of crops from sowing to harvesting.

(b) Define manure. What are its three kinds? State two differences between manures and fertilisers.

Ans. (a) Short duration plants are the ones which get matured at a faster rate. Advantages of such crops are:

(i) The entire process of their cultivation takes lesser time. So, such plants or varieties are more economical. The expenditure on irrigation and pesticides is less as compared to normal crops.

(ii) Since such crops spend less time on field therefore risk of crop failure due to conditions like flood, drought, etc. is reduced.

(iii) Farmers can grow multiple rounds of crops in a year/season.

(b) Manures are organic substances obtained from the decomposition of plant and animal wastes like cow dung and plant residues. Manures are major sources of organic matter, which supply nutrients in small quantities but organic matter in large quantities and increase the fertility of soil. Different types of manures are:

(i) Compost: Compost is prepared from farm and town refuse like vegetable waste, livestock excreta, animal refuse, sewage waste, eradicated weeds, crop stubble, straw, etc.

(ii) Green manure: Some plants like sunn hemp or guar are grown and then mulched by ploughing them into the soil. These green plants thus turn into green manure which helps in enriching the soil in nitrogen and phosphorus. It is used prior to the sowing of the crop seeds.

(iii) Vermicompost: Vermicompost makes use of earthworms. In this earthworms are introduced into a pit containing animal and plant refuse. Earthworms hasten the process of decomposition of plant and animal refuse.

The differences between fertiliser and manure: *Refer to the Ans. 15*

Check Your Progress 2

(Page 85)

Multiple-Choice Questions

1. Obtaining fish from natural water resources is known as

(a) culture fishery. (b) fish farming.

(c) capture fishing. (d) freshwater fishery.

Ans. (c) capture fishing.

2. Catla and rohu are examples of

(a) marine fish. (b) freshwater fish.

(c) brackish water fish. (d) none of these.

Ans. (b) freshwater fish.

3. Concentrate of cattle feed contains high level of

(a) vitamin. (b) protein.

(c) carbohydrate. (d) fat.

Ans. (b) protein.

4. Dairy animals kept for producing milk are termed as

(a) milk animals. (b) milch animals.

(c) draught animals. (d) poultry.

Ans. (b) milch animals.

5. Bee pasturage is important to produce honey as

(i) the quality of honey depends on pasturage.

(ii) the taste of honey depends on pasturage.

(iii) the harvesting process depends on pasturage.

(a) Option (i) is only correct.

(b) Option (ii) and (iii) are correct.

(c) Option (i) and (ii) are correct.

(d) All the options are correct.

Ans. (c) Option (i) and (ii) are correct.

Very Short Answer Type Questions

6. Name two vitamins which are added to poultry feed.

Ans. Vitamin A and K

7. How does Bombay Duck differ from common carp?

Ans. Common carp is a fresh water fish while Bombay Duck is a marine water fish.

8. Write the scientific name of

(a) little bee. (b) rock bee.

Ans. (a) Little bee: *Apis florea*

(b) Rock bee: *Apis dorsata*

9. Name the factors on which milk production in animals depend.

Ans. The milk production in animals depends on duration of lactation period.

10. What is mariculture?

Ans. Mariculture is a specialized branch of aquaculture which involves culturing marine organism on commercial basis in coastal waters for food and other products.

11. Enlist few management practices in poultry farming.

Ans. Few management practices in poultry farming are:

(i) Clean and proper shelter facilities.

(ii) Supply of balanced and hygienic food. A broiler chicken requires vitamin rich supplements especially vitamin A and K. Also, their diet includes protein rich food and enough fat while egg laying birds utilize more fibrous cheaper diets.

(iii) Timely vaccination.

(iv) Spraying of disinfectants at regular intervals.

12. Mention the names of four marine fish of high economic value.

Ans. Marine fish of high economic value are mullets, pearl spots, *bhetki*, pomfret.

13. Which method is commonly used for improving cattle breeds and why?

Ans. Cattle breeds are commonly improved by cross breeding exotic breeds and local breeds to get animals with desired qualities. The exotic or foreign breeds have long lactation period and provide us good quantity of milk. The local breeds show excellent resistance to the diseases. The two can be cross-bred to get the animals with both the desired qualities (long lactation period and resistance to diseases).

14. List two characteristics each of roughage and concentrate in relation to animal feed. Give one example of each.

Ans. The animal food contains two types of substances: roughage and concentrates.

Roughage:

(i) Roughage are coarse and fibrous straw materials having a low nutrient content such as carbohydrates, fats, minerals, proteins and vitamins.

(ii) Roughage are rich in fibre content and form the bulk of the cattle feed.

For example, hay (straw of cereals) and fodder obtained from berseem, cowpea, husk of gram, wheat, rice, etc.

Concentrates:

(i) Concentrates used in animal feed are mixture of substances, which are rich in protein and other nutrient.

(ii) They are low in fibre content.

For example, concentrates include grains, seeds and oilseed cakes.

Short Answer Type Questions

15. (a) What is the necessity of proper cleaning, sanitation and spraying disinfectants in poultry farms?

(b) Differentiate between milch and draught animals.

Ans. (a) Poultry farming involves the rearing and keeping of poultry birds such as fowl for

eggs and meat. Since they live in crowded conditions, the poultry birds suffer from a number of diseases. Therefore, it is necessary to spray disinfectants and maintain proper sanitation and cleaning to prevent them from various diseases and pest infestation.

(b)

Milch Animals	Draught Animals
The animals used for getting milk (also known as dairy animals)	The animals used for farm labour.
For eg.: Cow and goat	For eg.: Horse and mule

16. (a) Explain any two steps that are taken for increasing production in poultry, fisheries and bee-keeping.

(b) Name any two Indian bees.

Ans. (a) For increasing production in poultry, fisheries and beekeeping, use of breeds having desirable traits, good management practice such as maintenance of temperature and hygienic conditions, prevention and control of disease and pests, giving proper and balanced nutrition should be practiced.

(b) *Apis cerena indica* and *Apis dorsata*.

17. (a) Differentiate between apiculture and aquaculture.

(b) How can poultry and fish farming help in solving the food and nutrition problem?

Ans. (a)

Apiculture	Aquaculture
It is the rearing and maintenance of honeybees for obtaining honey, wax and other substances.	Rearing and management of aquatic animals such as fish, prawn, molluscs and crabs is called aquaculture.

(b) Poultry farming is done to raise domestic fowl for the production of eggs and chicken meat. Eggs and meat obtained from birds are a good source of nutrients. Poultry is fed with low fibre food stuffs which are converted into highly nutritious animal protein. Fish is also valuable and cheap source of food rich in animal protein. Fish proteins are easily digestible. Therefore, poultry and fish farming help in solving the food and nutrition problem.

Long Answer Type Questions

18. (a) Differentiate between capture fishery and culture fishery.

(b) How is culture of pomphret and mackerel different from that of catla and rohu?

(c) How are new varieties of poultry birds with desired traits produced?

Ans. (a)

Capture fishery	Culture fishery
It is a method of obtaining fish from natural resources.	It is a method of obtaining fish from fish farming.
There is no seeding and raising of fish.	The fish is seeded and reared.
Capture fishery is undertaken in both inland and marine waters.	Culture fishery is undertaken mostly inland and near sea shore.

(b) Pomphret and Mackeral are marine fishes cultured in sea water called mariculture. Whereas catla and rohu are freshwater fishes grown in inland fisheries like ponds, canals, reservoirs and rivers called composite fish culture.

(c) New improved varieties of poultry birds have been developed by cross-breeding the indigenous (e.g. Aseel) and foreign (e.g. Leghorn) breeds of poultry.

19. (a) Define lactation period. Name two breeds of cattle, which were selected for cross breeding due to their long lactation period. Why are they crossed with local breeds?

(b) Why livestock production needs to be improved? Explain. Why is there a necessity of animal husbandry?

Ans. (a) Lactation period is the period of milk production after the birth of a calf.

The exotic breeds of cattle like Holstein-Friesian, Jersey, Brown Swiss were selected for cross breeding due to their long lactation period.

The exotic or foreign breeds have long lactation period and provide us good quantity of milk. The local breeds show excellent resistance to the diseases. They are cross bred to get the animals with both the desired qualities (long lactation period and resistance to diseases).

(b) With the increase in population and better living standards, the demand for milk, eggs and meat also increased. This necessitated the improvements in the livestock production.

There is a need of animal husbandry:

(i) To increase milk production.

(ii) To increase egg production.

(iii) To increase meat production by rearing high meat-yielding animals.

(iv) To increase production of edible and economically important fish.

(v) To properly utilize animal waste for economic purposes.

(vi) It helps in producing good quality, high-yielding breeds of domestic animals. As a result, the production of food from animals is increased.

(vii) It also helps in the proper management of domestic animals and is beneficial for the farmer as his income from them is increased.

(viii) It also helps in increasing the quality of food products from animals, thereby increasing the availability of nutritious food.

Higher Order Thinking Skills (HOTS) Questions

(Page 86)

1. It was found that the water of a pond near a large agricultural field has become poisonous leading to death of fish in the pond. What could be the reason? Is there any relationship between the use of fertilisers in the agricultural field and the poisoning of pond water? Give reasons to support your answer.

Ans. The indiscriminate use of chemical fertilisers and pesticides in the agricultural field must have washed off the fertilisers to the water in the pond and polluted it. The fertilisers and pesticides are toxic compounds and not biodegradable. Hence, they persist in the environment for very long period of time and enter the food chain causing biomagnifications.

2. 'A farmer practising organic farming does not kill the insect pests with pesticides.' Do you agree with the statement? Give reasons.

Ans. Yes. Because organic farming is a farming system in which there is minimal or no use of chemicals as fertilisers, herbicides, pesticides etc. There is maximum input of organic manure, recycled farm-wastes, i.e. straw and livestock excreta. Organic farmers control pests and diseases through good plant nutrition and management.

3. Large population of cattle is present in our country but milk production is meagre. Why?

Ans. Large population of cattle is present in our country but milk production is meagre because of the following reasons:

(i) Indigenous breed having short lactation period are used.

(ii) Poor quality of feed given to cattle.

(iii) Cattles may not be healthy due to poor sanitation and housing conditions.

4. Suppose you are incharge of a grain store. How will you find out the presence of pests? Mention any two indicators.

Ans. Presence of pests can be indicated by loss in weight of grain, discolouration of grain leading to degraded quality.

5. Though application of fertilisers has led to vigorous growth in agriculture, yet the use of fertilisers is discouraged. Why? Give reasons.

Ans. Use of fertilisers is discouraged because the chemicals are recalcitrant compounds and hence persist in the environment for a long time. These chemicals get washed off into the water bodies and enter the food chain. The continuous use of these fertilisers will alter the soil chemistry. The nitrate content in water makes it unfit for drinking and these fertilisers in water bodies cause eutrophication.

6. What will happen, if both the crops in mixed cropping are similar? Give reasons to support your answer.

Ans. If both crops in mixed cropping are similar, then it may result in retarded growth. It will take place due to the fact that both of them will compete with each other in terms of getting same nutrient supply thus resulting in deterioration of the quality.

Self-Assessment

(Page 87)

Multiple-Choice Questions

1. The table lists the characteristics of a few Milch breed of cattle.

Milch breed of cattle	Characteristics
Jersey	Long lactation period
Sahiwal	Resistant to disease
Brown Swiss	Long lactation period
Red Sindhi	Resistant to disease

Based on the characteristics listed in the table, what will be the characteristics of the new breed if Jersey and Red Sindhi are cross-bred?

(a) The new breed will have a long lactation period and will be resistant to diseases.

(b) The new breed will have a small lactation period but will be resistant to diseases.

(c) The new breed will have a long lactation period but will not be resistant to diseases.

(d) The new breed will have a small lactation period and will not be resistant to diseases.

Ans. (a) The new breed will have a long lactation period and will be resistant to diseases.

2. Which of the following essential plant nutrients is supplied by soil?

(a) Hydrogen (b) Carbon

(c) Phosphorus (d) Oxygen

Ans. (c) Phosphorus

3. Mullets, prawns and mussels are examples of

(a) marine fish. (b) freshwater fish.

(c) finned fish. (d) shelled fish.

Ans. (d) shelled fish.

4. Growing different crops in the same field in a preplanned succession, to improve the quality and quantity of crop yield and maintain the fertility of soil is known as:

(a) crop rotation. (b) Intercropping.

(c) crop management. (d) plant breeding.

Ans. (a) crop rotation.

5. Kharif season extends from

(a) January to March (b) April to June.

(c) June to October. (d) October to January.

Ans. (c) June to October.

Assertion–Reason Type Questions

For question numbers 6 to 13, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both A and R are true and R is the correct explanation of the assertion.

(b) Both A and R are true but R is not the correct explanation of the assertion.

(c) A is true but R is false.

(d) A is false but R is true.

6. Assertion: Food security depends on both availability and access to the food.

Reason: Mixed farming and intercropping are not required for sustained livelihood.

Ans. (c)

7. Assertion: Soy products provide both carbohydrates and proteins.

Reason: Cereals are the main source of carbohydrates and pulses are source of proteins.

Ans. (b)

8. Assertion: Crop variety improvement involves intervarietal and interspecies crosses.

Reason: Any new variety of a crop must be tested under different agroclimatic conditions.

Ans. (b)

9. Assertion: Fertilisers are produced in factories.

Reason: Manure and compost are made by biodegradation of organic waste.

Ans. (b)

10. Assertion: Neem leaves and cyanobacteria are used in organic farming.

Reason: Organic farming is a system with minimal or no use of chemicals.

Ans. (a)

11. Assertion: Intercropping is when two crops are grown in a field one after the other.

Reason: Crop rotation is when two crops are grown in a field one after the other.

Ans. (d)

12. Assertion: Animal husbandry is the scientific management of animal livestock.

Reason: Cattle husbandry is important to increase milk production.

Ans. (b)

13. Assertion: Jersey is an exotic breed of cow.

Reason: Sahiwal is an exotic breed of cow.

Ans. (c)

Source-based/Case-based/Passage-based/ Integrated assessment questions

Answer the questions on the basis of your understanding of the following passages and the related studied concepts.

14. Honey is widely used from ancient times in India and therefore making honey has become an agricultural enterprise. Since bee keeping needs low investment, farmers use it as an additional income generating activity. In addition to honey, the beehives are a source of wax which is used in various medicinal preparations.

I. (a) What is the scientific name given to commercial production of honey by managing bee keeping?

(b) State one advantage of keeping honey bees along with crop fields.

(c) (i) What do you understand by the term 'pasturage'?

OR

(ii) Which variety of honey bees is commonly used for commercial honey production?

Ans. (a) Apiculture

(b) Honey bees are kept along with crop fields as they are an excellent pollinators.

(c) (i) Pasturage is the flowers available to the honey bees for nectar and pollen collection. The quality and taste of honey depends on the kind and quality of pasturage.

OR

(ii) The indigenous varieties of honey bees used for commercial honey production are *Apis cerana indica*, *Apis dorsata* and *Apis florea*.

II. (a) The commercial production of honey by managing bee keeping is known as

(i) sericulture. (ii) apiculture.

(iii) horticulture. (iv) pisciculture.

Ans. (ii) apiculture.

(b) Keeping bee boxes alongside the crop fields is a common practice. The additional advantage of this is

(i) wax production.

(ii) better quality honey production.

(iii) help in pollination.

(iv) less water content in honey.

Ans. (iii) help in pollination.

(c) Which of the following is commonly known as rock bees?

(i) *Apis cerana*

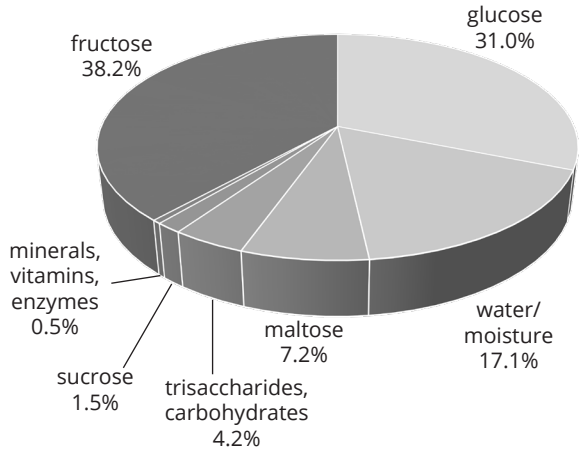
(ii) *Apis florea*

(iii) *Apis dorsata*

(iv) *Apis mellifera*

Ans. (iii) *Apis dorsata*

(d) The given pie chart shows the composition of a honey sample. Study the chart and select the correct option from the following regarding the quality of the honey sample.



(i) It is adulterated with lots of sugar syrup.

(ii) It will be quickly contaminated with fungi for the high water content.

(iii) It is a good quality honey with high percentage of natural sugars like fructose and glucose.

(iv) Both (i) and (ii)

Ans. (iii) It is a good quality honey with high percentage of natural sugars like fructose and glucose.

(e) Select the incorrect statement about bee keeping practices.

(i) It provides honey with great nutritive value.

(ii) It provides bee wax.

(iii) Honey bees are good pollinating agents.

(iv) It is a high investment agricultural enterprise.

Ans. (iv) It is a high investment agricultural enterprise.

15. Ankita was travelling with her family. While travelling, she saw huge structures on which FCI was written prominently. She asked her mother about it and her mother explained that these are grain storage structures owned by FCI. Ankita decided that she will go back and request her school to organize a visit so that she can know more about it.

I. (a) Expand the term FCI.

(b) List the various factors affecting the storage of foodgrains.

(c) (i) Mention one function of FCI.

OR

(ii) What are the two methods of foodgrain storage?

Ans. (a) Food Corporation of India

(b) There are two factors responsible for damaging the stored food materials – abiotic (inappropriate moisture content, temperature

etc.) and biotic factors (Enzymatic action within food material, insects, mites, rodents, birds and other animals).

(c) (i) FCI maintains deposits of various kinds such as food storage depots and buffer storage complexes.

OR

(ii) Dry and cold storage are the methods of foodgrain storage.

II. (a) The term FCI stands for

(i) Food Commission of India.

(ii) Food Council of India.

(iii) Food Corporation of India.

(iv) Food Committee of India.

Ans. (iii) Food Corporation of India.

(b) The factor/factors affecting food grains is/are

(i) moisture content.

(ii) temperature.

(iii) insects and moulds.

(iv) all of these.

Ans. (iv) all of these.

(c) The function/functions of FCI is/are

(i) food storage.

(ii) transportation of seeds.

(iii) maintain buffer stock.

(iv) all of these.

Ans. (iv) all of these.

(d) 2,4-D and Atrazines are commonly used in crop fields. These are

(i) pesticides.

(ii) weedicides.

(iii) fungicides.

(iv) insecticides.

Ans. (ii) weedicides.

(e) In a farm house, some food grains are stored for next year. After few months it has been found that the grains are damaged by moulds. This may occur due to

(i) improper temperature control.

(ii) use of insecticides.

(iii) moisture in the air.

(iv) both (i) and (iii).

Ans. (iv) both (i) and (iii).

16. Composite fish culture is the farming of different types of fishes having different feeding habits in the same pond, in the same period. They do not compete for food. It increases the productivity of the pond. For an example, rohu, catla, mrigal, silver carps, common carps and grass carps are commonly grown together. Rohu is a middle-zone feeder, catla feeds on surface (zooplankton), mrigal is a bottom feeder and grass carp feeds on weeds. Silver carp is also surface feeder, but they feed on phytoplanktons. Common carps are detrivorous or omnivorous and bottom feeders. Therefore, different parts of the pond are well utilised and fish species do not compete for food with each other.

I. (a) What is composite fish culture?

(b) What are the advantages of composite fish culture?

(c) (i) Is composite fish culture a better approach than monoculture?

OR

(ii) Name two bottom feeder fish species.

Ans. (a) In composite fish culture, several species of fishes having different food habits are reared together in a single fish pond to increase productivity.

(b) Fish production is increased within the same cost. Fish with different food habits are chosen in composite fish culture, so, all the available food in the pond is utilized.

(c) (i) Composite fish culture is generally considered a better option than monoculture. It improves the resource utilization. By cultivating multiple species together, each fish species occupies different ecological niches, leading to better growth rates and overall production. This method is more sustainable and resilient compared to monoculture. However, composite fish culture has a major problem that is the lack of availability of good quality seeds.

OR

(ii) Mrigal and common carp are bottom feeders.

II. (a) Which of the following fish is surface feeder?

(i) Rohu (ii) Mrigal

(iii) Catla (iv) Common carp

Ans. (iii) Catla

(b) Rearing and management of fish is called

(i) aquaculture. (ii) pisciculture.

(iii) shell fishery. (iv) all of these.

Ans. (ii) pisciculture

(c) In composite fish culture, Rohu is used as a

(i) surface feeder. (ii) middle-zone feeder.

(iii) bottom feeder. (iv) detrivore.

Ans. (ii) middle-zone feeder

(d) Obtaining fish from natural water resources where sea water mixes with fresh water is known as

(i) marine fishery. (ii) brackish water fishery.

(iii) capture fishing. (iv) freshwater fishery.

Ans. (ii) brakish-water fishery

(e) Which of the following is not a marine fish?

(i) Sardine (ii) Mackerel

(iii) Tuna (iv) Mullet

Ans. (iv) Mullet

Very Short Answer Type Questions

17. Based on photoperiod, what types of crops are mustard and wheat? Name three micronutrients.

Ans. Mustard and wheat are Rabi crops.

Iron, zinc, manganese are micronutrients.

18. Why are Jersey and Brown Swiss popular cattle breeds?

Ans. Jersey and Brown Swiss are popular cattle breeds as they have long lactation period.

19. Choose the odd one and give reason:

Mullets, prawns, bhetki and pearl spots

Ans. Prawns as they are shelled fish whereas others are finned fish.

20. Define animal husbandry.

Ans. The branch of agriculture related to the scientific management of animal livestock is known as animal husbandry.

21. A farmer was advised not to use nitrogenous fertilisers for the growth of his crops as the crops had been enriched by nutrients by the crop grown earlier. Give reason for such an advise and name any one crop which the farmer might have grown.

Ans. Leguminous crops were grown on the field. *Rhizobium* bacteria lives in the root nodules of leguminous crops which fixes atmospheric nitrogen thus enriching the soil with nitrate and nitrite. Therefore, the farmer was advised not to use nitrogenous fertilisers for the growth of his crops. One such crop is gram.

22. Give an account of the two fresh initiatives in the field of irrigation.

Ans. Two fresh initiatives have been adopted for increasing the water availability for agriculture. These initiatives are:

(i) Rainwater harvesting

(ii) Watershed management

In rainwater harvesting, the rainwater that falls on the ground or rooftops of buildings is channelled by canals and recharged into the ground by digging tunnels while watershed management involves building of small check dams to increase percolation of water into the ground.

23. (a) Define the term sustainable agriculture.

(b) Name the nutrients that plants get from air, water and soil.

Ans. (a) Sustainable agriculture means successful management of resources for agriculture to satisfy the changing human needs, while maintaining or enhancing the quality of environment and conserving natural resources.

(b) Nutrients obtained from:

Air: Carbon and oxygen

Water: Hydrogen and oxygen

Soil: Soil provides maximum number (13) of essential nutrients to the plant. The essential elements provided by soil are nitrogen, phosphorus, potassium, magnesium, sulphur, calcium, iron, manganese, boron, zinc, copper, molybdenum and chlorine.

24. (a) Name two internal parasites of cattle.

(b) Why fish culture is done with a combination of rice cultivation?

Ans. (a) Two internal parasites are worms which affect the stomach and intestine and flukes which damage the liver.

(b) Fish culture is done with the combination of rice cultivation because in rice crops we have to put lot of water. We can put fishes into the water so that they can eat up the insects which harm the crop and its manure is dissolved into the soil and become a nutrient to the plant. Therefore, the income of farmer will also increase.

Short Answer Type Questions

25. What do you mean by composite fish culture? Write its one advantage and one disadvantage.

Ans. Rearing of several species of fishes together in a single fish pond is known as composite fish culture.

Advantages of composite fish culture:

(i) Fish production is increased within the same cost.

(ii) Fish with different food habits are chosen so that they do not compete for food among themselves, so, all the available food in the pond is effectively utilised.

Disadvantage of composite fish culture is:

Many of these fish breed only during monsoon. Thus, the fish seed gets mixed with that of other species. So, a major problem is the lack of availability of good quality seed.

26. (a) "Poultry is India's most efficient converter of low fibre food stuff into highly nutritious animal protein." Comment.

(b) Give two examples of crops that yield source of carbohydrate, protein and fat each.

Ans. (a) The basic aim of poultry farming is to raise domestic fowl for egg production and chicken meat. These poultry birds are the efficient converters of agricultural by-products, particularly cheaper fibrous wastes which are unfit for human consumption into high quality meat. It also helps in providing eggs. For this reasons, it is said that, "poultry is India's most efficient converter of low fibre food stuff into highly nutritious animal protein food."

(b) Crops that yield source of:

(i) Carbohydrate: Wheat, rice, maize, millets,

(ii) Protein: Gram (*chana*), black gram (*urad*), pea (*matar*), green gram

(iii) Fat: mustard, castor, sunflower and linseed

Long Answer Type Questions

27. (a) List different ways in which biotic and abiotic factors affect stored food grains.

(b) What preventive and control measures need to be taken before and after storing grains?

(c) Give an example to explain the meaning of integrated farming practices.

Ans. (a) The biotic factors (insects, microorganisms, rodents, birds) and abiotic factors (inappropriate moisture, temperature, etc) affect stored grains by degradation in quality, loss in weight, poor germination, discolouration of produce, leading to poor marketability.

(b) The preventive and control measures include strict cleaning of the produce before storage, proper drying of the produce first in sunlight and then in shade and fumigation using chemicals.

(c) An example of integrated farming practice is culturing fish in combination with a rice crop, so that five or six fish species are grown in the water in the paddy field. This way fish are able to utilize the feed and water available in the rice field.

28. (a) Write two characteristics of good cattle shelter.

(b) What should be the components of balanced ration for cattle?

(c) Write two symptoms of sick cattle.

(d) Mention the preventive measures taken to control diseases of dairy animals.

Ans. (a) Characteristics of good cattle shelter are:

(i) It should protect the animals from heat, cold, rain and extreme weather.

(ii) It should be clean, dry and well-ventilated.

(iii) It should get proper sunlight during the day and should be properly aerated.

(iv) It should have proper arrangements and outlets for disposal of wastes including animal excreta.

(b) The cattle should be fed balanced ration of roughage and concentrate in appropriate amount.

(c) A sick animal does not feed regularly and does not has a normal posture.

(d) Good management practices will prevent diseases on dairy animals. They should be kept in a clean, well ventilated housing. Timely vaccination should be given to dairy animals to control major diseases.

Let's Compete

(Page 90)

Multiple-Choice Questions

1. A farmer in town X changed the cropping pattern of the farm. Earlier the farm had only soyabean but then the farm was divided into rows of different crops. Two rows of soyabean and alternate two rows had maize and the next two had cowpea. What would be the most likely effect of the new cropping pattern?

(a) Increase in yield

(b) Degradation of land

(c) Increased growth of weeds

(d) Reduced intake of nutrients by crops

Ans. (a) Increase in yield

2. Which one is an oil yielding plant among the following?

(a) Lentil (b) Sunflower

(c) Cauliflower (d) *Hibiscus*

Ans. (b) Sunflower

3. Which one of the following is grown in freshwater?

(a) Tuna (b) Carp

(c) Sardine (d) Pomphret

Ans. (b) Carp.

4. Silver revolution is related to the increase in production of

(a) egg. (b) meat.

(c) milk. (d) grains.

Ans. (a) egg.

5. A pulse crop is grown in the time interval between two cereal crops to compensate for the loss of

(a) phosphorus. (b) sulphur.

(c) potassium. (d) nitrogen.

Ans. (d) nitrogen.

6. An advantage of induced breeding in composite fish culture is to

(a) increase the growth of fish.

(b) get pure seed.

(c) prevent competition among different fish species.

(d) all of these.

Ans. (b) get pure seed.

7. Manure is used in sandy soils mainly to

(a) provide all essential nutrients to crops.

(b) increase the water holding capacity.

(c) avoid water logging.

(d) reduce soil pollution.

Ans. (b) increase the water holding capacity.

8. Four groups capture marine fishes with different instruments as listed in the table.

Group	Tool/Equipment use to capture marine fishes
A	Hand-pulled fishing nets
B	Fishing nets guided by echo-sounder
C	Fishing nets guided by satellite
D	Pulley-based fishing nets

Which set of groups will most likely get the maximum fish catch?

(a) Groups A and B (b) Groups B and C

(c) Groups C and D (d) Groups D and A

Ans. (b) Groups B and C

9. Dwarfness in cereals is a desirable agronomic trait because

(a) such plants consume less nutrients.

(b) they are easy to harvest.

(c) they give good fodders to cattles.

(d) they show disease resistance.

Ans. (a) such plants consume less nutrients.

10. The science of improving crop varieties is called

(a) hybridization. (b) plant breeding.

(c) selection. (d) genetic manipulation.

Ans. (b) plant breeding.

Life Skills

(Page 90)

1. Ramesh lives in a village. He notices that most farmers are growing same crops year after year. Because of it, the farmers are not getting good yield. He advised the farmers to sow a leguminous crop between two cereal crops.

(a) Why did Ramesh advise the farmers to sow a leguminous crop between two cereal crops? What is its effect on soil fertility?

(b) Name this agricultural practice. State any two advantages of this practice.

(c) What value is shown by Ramesh?

Ans. (a) Cereal crops utilise nitrogen from the soil. If it is grown year after year, the soil becomes deficient in nitrogen. Sowing a leguminous crop between two cereal crops enriches the soil with nitrogen. *Rhizobium* bacteria present in the root nodules of leguminous crop fixes atmospheric nitrogen making the soil rich in nitrogen at no cost. The fertility of the soil increases leading to increase in grain production.

(b) This agricultural practice is known as crop rotation. Two advantages of crop rotation are:

Rotation of Crops Improves Soil Fertility: Hence, it brings about an increase in the production of foodgrains.

Helps in Weed and Pest Control: This is because weeds and pests are very choosy about the host crop plant which they attack. When the crop is changed, the weeds and pests associated with that crop usually disappear.

(c) Values shown by Ramesh are awareness, community service and social responsibility.

2. A lake situated in a village was the main source of water for the villagers. However, people started cultivating crops around the lake. They added fertilisers to their fields in order to enhance the yield. Soon they discovered that the lake has been completely covered with green floating plants and fish living in it started dying in large numbers.

(a) Analyse the situation and give reasons for excessive growth of plants and death of fish in the lake.

(b) What steps should be taken to prevent this situation?

(c) What values are shown by the villagers?

Ans. (a) The chemical fertilisers, specially nitrogenous, get washed away due to excessive irrigation and are thus not fully absorbed by the plants. These fertilisers reach rivers, lakes and other waterbodies resulting in the growth of algal bloom. This can increase the biological oxygen demand (BOD) of water which causes harm to

aquatic animals like fish and aquatic plants. This phenomenon is known as eutrophication.

(b) Farmers should consider the use of manure instead of fertilisers. This will not cause any damage to aquatic life.

(c) Villagers are unaware and not environment friendly.

3. Ranveer and Mahmud are friends and both are farmers. Ranveer follows modern farming practice in which he uses large amounts of chemical fertilisers and pesticides to increase the crop yield. Mahmud, on the other hand, grows two or more crops simultaneously in the same field in a definite row pattern.

(a) Name the farming practice practiced by Mahmud.

(b) What are the advantages or disadvantages of this practice?

(c) What are the effects on soil quality in the long run in the farming practice followed by Ranveer?

(d) State the values shown by Ranveer and Mahmud.

Ans. (a) Cropping pattern practiced by Mahmud is intercropping.

(b) Advantages of intercropping are:

It makes optimum utilization of natural resources such as sunlight, land and water.

Intercropping also helps to prevent spread of pests and diseases to all the plants belonging to one crop in the field.

(c) In the long run, the continuous use of chemical fertilisers can cause drastic alterations in soil chemistry and affect the crop yield. Fertilisers also harm the soil microorganisms and thus destroy soil fertility as the organic matter in the soil is not replenished.

(d) Ranveer is unaware and not environment friendly while Mahmud is aware and environment friendly.

Natural Resources

Checkpoint (Page 93)

1. What is biosphere?

Ans. The life-supporting zone of the earth where all three zones, namely atmosphere, hydrosphere and lithosphere interact with each other, making life possible is called biosphere.

2. What are the abiotic and the biotic components of the ecosystem?

Ans. The biotic components of biosphere are the living things. Various microorganisms, plants and animals form the biotic components of biosphere. Those components of biosphere that do not have life are called abiotic or non-living components. Air, water, soil, light and temperature form the non-living or abiotic components of biosphere.

3. Define greenhouse effect. Name few greenhouse gases.

Ans. The greenhouse effect is a natural process that warms the earth's surface. When the Sun's energy reaches the earth's atmosphere, some of it is reflected back to space and the rest is absorbed and re-radiated by greenhouse gases.

Few greenhouse gases are carbon dioxide, methane, water vapour, etc.

4. What do you mean by acid rain? How does it affect us?

Ans. Fossil fuels contain small amounts of nitrogen and sulphur. When these fuels are burnt, different oxides of nitrogen and sulphur are produced. The oxides of nitrogen and sulphur combine with water to form nitric acid and sulphuric acid, respectively. These acids dissolve in rainwater and fall as acid rain.

Acid rain causes lot of damage to monuments and buildings as well as vegetation.

5. What is smog? Name two diseases caused by it.

Ans. Smog is a mixture of smoke, dust particles and small drops of fog formed due to the condensation of water. It causes diseases like asthma and allergies.

6. Explain SPM. How are SPM added to air?

Ans. SPM or the suspended particulate matters are very fine solid and liquid particles suspended in air. It includes both organic and inorganic particles, such as dust, pollen, soot, smoke, and liquid droplets. They are added to air due to combustion of fossil fuel, construction activities, agricultural operations, industrial processes, etc.

7. Can hot water be considered as a pollutant? Explain.

Ans. Yes, hot water can be considered as pollutant because change in temperature can kill the aquatic organisms.

8. How are CFCs added to the atmosphere? How does it affect the ozone layer?

Ans. Chlorofluorocarbons (CFCs) have been released into the atmosphere through air-conditioner, refrigerator, aerosol, etc. CFCs destroy the ozone molecule which results in thinning of ozone layer in the stratosphere.

9. Mention two human activities which affect the quality of soil on a large scale.

Ans. Deforestation, overgrazing and excess use of fertilisers affect the quality of soil on a large scale.

Check Your Progress 1

(Page 104)

Multiple-Choice Questions

1. Marked temperature changes in aquatic environment can affect

(a) breeding of animals.
(b) more growth of aquatic plants.
(c) process of digestion in animals.
(d) availability of nutrients.

Ans. (a) breeding of animals.

2. Soil erosion can be prevented by
(a) raising forests.
(b) deforestation.
(c) excessive use of fertilisers.
(d) overgrazing by animals.

Ans. (a) raising forests.

3. Growth of lichens on barren rocks is followed by the growth of
(a) moss. (b) ferns.
(c) gymnosperms. (d) algae.

Ans. (a) moss.

4. Which of the following factors do not lead to soil formation in nature?
(a) Sun (b) Wind
(c) Water (d) Polythene bags

Ans. (d) Polythene bags

Very Short Answer Type Questions

5. Name two common pathogens in polluted water.

Ans. Bacteria and virus.

6. Give two reasons why water is essential for living organisms.

Ans. Water is essential for living organisms because:
(i) All cellular processes take place in aqueous medium in our body.
(ii) Water is also needed for transportation of various substances such as nutrients from one part of our body to another.

7. How does the atmosphere regulate the temperature of the earth?

Ans. The atmosphere keeps the average temperature of the earth steady by preventing the sudden increase in temperature during daytime. It also slows down the escape of heat into outer space during night and as a result does not let the weather become too cold during night.

8. Soil formation is done by both abiotic and biotic factors. List the names of these factors by classifying them as abiotic and biotic.

Ans. Abiotic factors in soil formation are sun, water and wind while biotic factors are lichen, moss and tree.

9. What do you mean by natural resources?

Ans. The materials present in natural environment that are useful to living organisms are called natural resources. These natural resources are soil (land), water and air.

10. Which particles act as the nuclei for the condensation of water vapours in the atmosphere?

Ans. Dust particles.

11. Mention the causes of soil pollution.

Ans. Soil pollution is mainly caused by the following:
(i) Raw manure (farm and animal manure containing pathogens)
(ii) Agricultural waste (chemical fertilisers and pesticides)
(iii) Industrial waste (fly ash, metallic ash, etc.)
(iv) Domestic waste (paper pulp, plastic, polythene bags, rubber, discarded gadgets, glass, metal scrap, etc.)

12. List measures of conserving soil fertility.

Ans. Fertility of soil can be conserved by:
(i) Judicious use of fertilisers and pesticides
(ii) Controlling the release of effluents from industries into the soil

13. "The moon has extreme temperature variations, even though it is at the same distance from the sun as the earth". Justify the statement.

Ans. Although moon is at almost the same distance away from the sun as earth, it shows great variation in temperature during daytime and night. The surface temperature of moon ranges from –190 °C (during night) to 110 °C (during day) since there is no atmosphere on moon. Because of so much variation in temperature, there is no life on the moon.

14. Explain how water and sun help in soil formation?

Ans. Water: Water plays an important role in the formation of soil. It gets into the cracks in the rocks which are formed due to uneven heating by the sun. Later when this water freezes, it causes the cracks to widen. Water flowing over the rocks over long periods of time wears away even hard rock. Fast flowing water often carries big and small particles of rock downstream. During water flow, these rocks hit other rocks and the resultant collisions cause the rocks to break into smaller and smaller particles. These particles are then taken along by water and deposited to far away places from its parent rock.

The Sun: Sun plays an important role in soil formation. During daytime, rocks get heated due to sun's energy. As a result, they expand. At night,

when the temperature lowers down, these rocks cool down and contract. However, all parts of rocks do not expand or contract at the same rate. As a result of difference in the rate of contraction in various parts of rocks, cracks are formed in them. Ultimately, huge rocks break down into smaller pieces of soil particles.

Short Answer Type Questions

15. How is soil formation different from soil erosion? Write two factors responsible for each of them.

Ans. The process of breaking down of huge pieces of rocks and its minerals into fine particles due to continuous action of physical, chemical and biological agents is called soil formation. Factors responsible for soil formation are sun, water, wind and living organisms.

The removal and transportation of the top layer of soil from its original position to another place by flowing water or wind is called soil erosion. Factors responsible for soil erosion are strong winds, heavy rains, improper farming, dust storms, frequent floods and also indiscriminate human activities.

16. (a) How does the combustion of fossil fuels increase the amount of suspended particles in air?

(b) How is smog formed? What does it indicate?

Ans. (a) Combustion of fossil fuel produces unburnt carbon particles which increases the amount of suspended particulate matter in the atmosphere.

(b) Smog is a mixture of smoke, dust particles and small drops of fog formed due to the condensation of water. When fossil fuels are burnt, the atmospheric pollutants and gases are released in the air. In the presence of heat from sunlight, these gases, dust particles and small fog droplets combine together to form smog. It indicates air pollution.

17. (a) What causes wind?

(b) 'Dust is a pollutant.' Justify.

(c) State two harmful effects of air pollution.

Ans. (a) Wind is caused by differences in the atmospheric pressure between two or more places.

(b) Dust is also considered as a pollutant of air. It is present in air as suspended particulate matter. It can cause allergy and other respiratory diseases. It also affects plant growth by covering stomata on leaf surface and blocking them. It also forms smog with smoke and fog thus reducing visibility.

(c) Global warming, acid rain, respiratory diseases like asthma and bronchitis are few harmful effects of air pollution.

Long Answer Type Questions

18. (a) Is it necessary to conserve natural resources? Explain.

(b) Define smog. Name two diseases caused by regularly breathing the polluted air.

Ans. (a) It is necessary to conserve the natural resources because:

(i) It will help in maintaining ecological stability.

(ii) Resources will be available for the future generation to be utilised.

(iii) Resources are essential for the development of the country.

(iv) Irrational use of resources leads to socio-economic problem.

(b) Smog is a mixture of smoke, dust particles and small drops of fog formed due to the condensation of water. Two diseases caused by smog are asthma and allergy.

19. (a) What is the significance of dissolved oxygen to the aquatic organisms?

(b) What is weathering? Mention and describe the different types of weathering.

Ans. (a) Oxygen is found dissolved in water. Dissolved oxygen in water is used by the animals and plants that live in it. Any change in water could reduce the amount of dissolved oxygen and adversely affect these aquatic organisms. This could also lead to depletion of other nutrients from the water bodies.

(b) The process of breaking down of huge pieces of rocks and its minerals into fine particles due to continuous action of physical, chemical and biological agents is called weathering. Weathering can be classified as physical, biological and chemical weathering.

Physical Weathering

It is the weathering of rocks by variation in temperature, water and wind.

Biological Weathering

Weathering of rocks by biological components like animals, plants and microbes is known as biological weathering. Organisms like lichens and mosses grow on the surface of rocks. While growing, they release certain substances that erode the rock surface to powder and form a thin layer of soil. When other small plants like

moss, grow on this surface, they further break it down. The roots of big trees go into cracks in the rocks and as the roots grow bigger, the cracks become wider leading to weathering.

Chemical Weathering

There are many chemical substances present in rocks like sulphates, chlorides and phosphates of calcium, potassium and magnesium. During weathering, these chemicals are converted into solution and make the rocks porous leading to further disintegration. Water also hydrolyses certain minerals in rocks causing weathering.

Check Your Progress 2

(Page 112)

Multiple-Choice Questions

1. Which one of the following processes is not a step involved in the water cycle operating in nature?

(a) Evaporation (b) Transpiration

(c) Precipitation (d) Photosynthesis

Ans. (d) Photosynthesis

2. The process of nitrogen fixation in bacteria does not take place in the presence of

(a) molecular hydrogen. (b) water.

(c) elemental oxygen. (d) elemental nitrogen.

Ans. (c) elemental oxygen.

3. Name a gas which plays major role in global warming.

(a) Carbon monoxide (b) Nitrous oxide

(c) Carbon dioxide (d) Sulphur dioxide

Ans. (c) Carbon dioxide

4. *Nitrosomonas* bacteria convert

(a) nitrite to nitrate. (b) ammonia to nitrate.

(c) ammonia to nitrite. (d) nitrite to ammonia.

Ans. (c) ammonia to nitrite.

Very Short Answer Type Questions

5. Name the disease that can be caused by UV radiation.

Ans. Skin cancer and cataract.

6. Name the bacteria responsible for nitrification in nature.

Ans. Nitrobacter.

7. What is the role of respiration in oxygen cycle?

Ans. The role of respiration in oxygen cycle is to release carbon dioxide which is then taken up by the plants to carry out photosynthesis to release oxygen which is used up by animals in respiration to produce carbon dioxide for plants again and this cycle goes on.

8. Write the names of some greenhouse gases.

Ans. Carbon dioxide, methane and water vapour are few greenhouse gases.

9. State two consequences of global warming.

Ans. (i) It would cause melting of continental and mountain glaciers and thus, would cause flooding of coastal areas of some countries.

(ii) It would also bring about climate change, thereby increasing the chances of cyclones, hurricanes and floods.

10. Give two ways by which carbon dioxide is fixed.

Ans. Carbon dioxide is fixed by the following ways:

(i) Green plants convert carbon dioxide to glucose in the presence of sunlight during the process photosynthesis.

(ii) Marine animals use carbonates dissolved in sea water to make their shell.

11. What is atmospheric fixation of nitrogen? State the role of symbiotic bacteria in nitrogen cycle of nature.

Ans. Atmospheric nitrogen fixation is the process by which lightning converts nitrogen gas present in the atmosphere into nitrates which can be utilised by various plants.

Symbiotic bacteria like *Rhizobium* lives in the root nodules of leguminous plants and can fix atmospheric nitrogen into nitrates which can be utilised by plants.

12. We are lucky that ozone is not stable near to the earth's surface. Why?

Ans. Ozone is a combined form of three oxygen atoms. Though it protects us from ultraviolet radiations from the sun, it is harmful because it is poisonous. If it would have been stable near the earth's surface, living organisms would not have survived on earth. That's why we are lucky that it is not stable near the earth's surface.

Short Answer Type Questions

13. What is ozone hole? Where is it found? What are its consequences?

Ans. A severe depletion of ozone layer of stratosphere caused by the destruction of ozone by CFCs and other ozone depleting substances is known as ozone hole.

It is found above Antarctica.

Ozone layer protects us by absorbing the dangerous ultraviolet (UV) rays coming from the sun. Without the ozone layer, organisms on the earth would be subjected to life threatening radiation from sun causing diseases like skin cancer and cataract.

14. (a) What is the role of bacteria in nitrogen cycle?

(b) What happens to nitrate once it enters the cycle?

Ans. (a) Bacteria play an important role in biological nitrogen fixation, ammonification, nitrification and denitrification.

Biological nitrogen fixation: Nitrogen-fixing bacteria can be free-living like *Azotobacter* and *Clostridium*, or symbiotic like *Rhizobium.* These bacteria live in the root nodules of dicot leguminous plants and can fix atmospheric nitrogen into nitrates.

Ammonification: Once the animals and plants die, the dead remains of plants and animals are converted into ammonia, carbon dioxide and water by the action of putrefying bacteria, actinomycetes and fungi (decomposers) present in the soil and water.

Nitrification: The process of conversion of ammonia into nitrites and nitrates is called nitrification. Nitrification is brought about by some nitrifying bacteria like *Nitrobacter* and *Nitrosomonas* present in the soil.

Denitrification: The conversion (degradation) of nitrate and nitrite salts to elemental nitrogen is called denitrification. It is carried out in the soil by free-living bacteria called *Pseudomonas*.

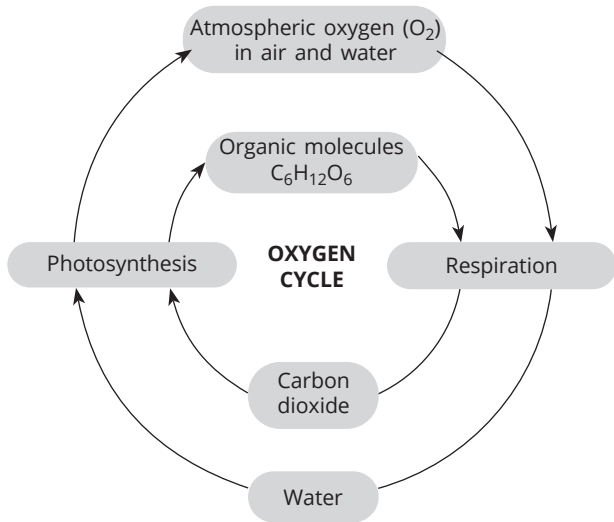
(b) Plants absorb nitrogen in the form of nitrate from the soil and convert them into amino acids which in turn form plant proteins. This is known as nitrogen assimilation. Other complex organic compounds containing nitrogen are also formed by using some other biochemical pathways. These proteins and complex compounds are subsequently consumed by animals. After death of plants and animals, the protein is converted to ammonia by ammonifying bacteria in the soil. The ammonia is further converted to nitrite and nitrate by nitrifying bacteria and the cycle continues.

15. (a) Mention the two forms of oxygen found in the atmosphere.

(b) Draw a labelled flow diagram of oxygen cycle in nature.

Ans. (a) Two forms of oxygen are diatomic oxygen (O_2) and triatomic oxygen or ozone (O_3)

(b)



Oxygen cycle in nature

Long Answer Type Questions

16. (a) With the help of a labelled diagram show nitrogen cycle in nature.

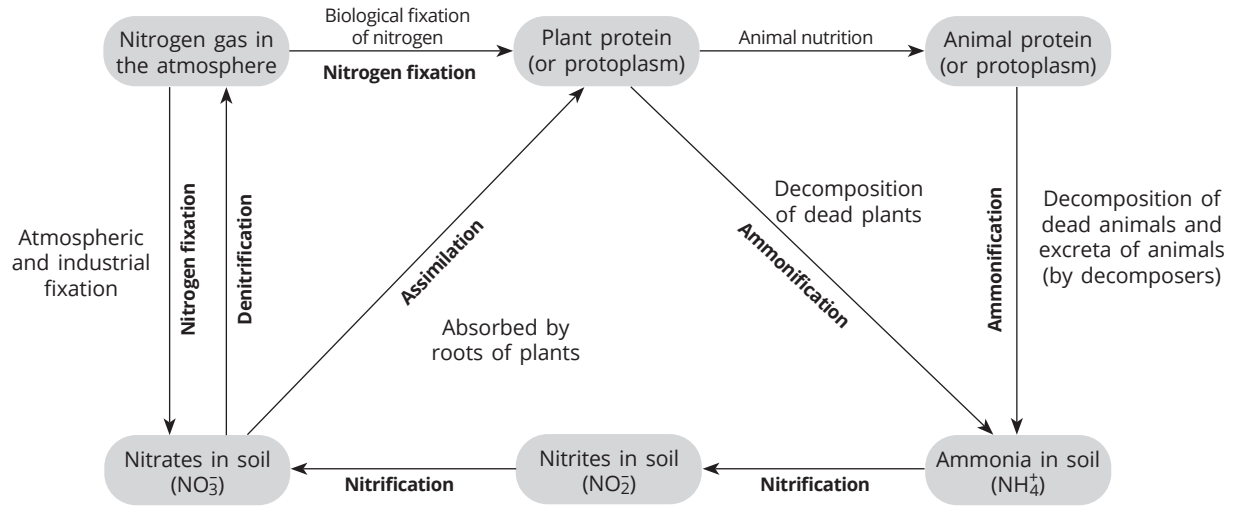
(b) Describe briefly any two processes involved in cycling of nitrogen in the environment.

Ans. (a) Nitrogen cycle in nature (Refer to figure on the top of next page)

(b) Two processes involved in nitrogen cycle are:

Biological Nitrogen Fixation: It is the conversion of atmospheric nitrogen into nitrogen compounds by nitrogen-fixing bacteria. Nitrogen-fixing bacteria can be free-living like *Azotobacter* and *Clostridium*, or symbiotic like *Rhizobium.* These bacteria live in the root nodules of dicot leguminous plants and can fix atmospheric nitrogen into nitrates. Certain blue-green algae like *Anabaena* and *Nostoc* and non-leguminous plants like *Ginkgo* can also fix atmospheric nitrogen into nitrates.

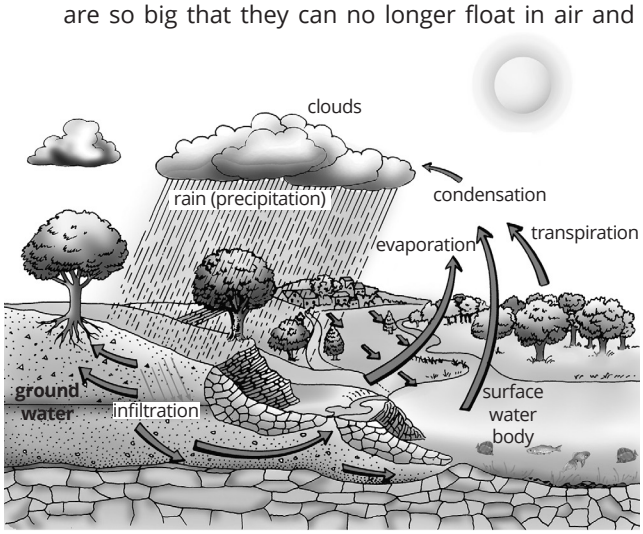
Ammonification: The process of conversion of complex organic compounds like proteins of dead and decaying organisms into ammonia is called ammonification. Once the animals and plants die, the dead remains of plants and animals are converted into ammonia, carbon dioxide and water by the action of putrefying bacteria, actinomycetes and fungi (decomposers) present in the soil and water.



Nitrogen cycle

17. How does cloud form in the sky? Draw the biogeochemical cycle involved in it. What are the different states in which water is found in the water cycle?

Ans. Water from the surface of water bodies like rivers, oceans and so on transfer into the atmosphere as water vapour. As a result of evaporation, water changes from the liquid to gaseous phase. Water evaporates from oceans, ponds, lakes, ground, plants (during transpiration) and animals (as sweat and through respiration). The water vapours being lighter rise up and condense to form tiny water droplets. These tiny droplets round up around the dust particles available in the atmosphere and form clouds. When clouds are cooled due to rising up, the small droplets in them cool further and they come closer to each other. Many droplets combine to form big drops of water. These drops are so big that they can no longer float in air and fall down on the earth as rain.



Water cycle

Water is found in all the three states in water cycle. It is present in gaseous state as water vapour in the atmosphere, in liquid state as water droplets which precipitates down as rain and in solid state as hail, snow and ice sheet.

Higher Order Thinking Skills (HOTS) Questions

(Page 113)

1. 'Erosion of top soil disturbs the nitrogen cycle.' Justify this statement. Name any two non-leguminous plants which can fix nitrogen.

Ans. If the top soil is eroded, various free living nitrogen fixing bacteria and blue green algae that live in the top soil will be lost thereby disturbing the nitrogen cycle. Non-leguminous plans like Ginkgo and Alder can fix nitrogen.

2. There are two colonies A and B situated near a river. A is at a higher place and B is at a distance down the stream. When members of colony A take bath or wash clothes, they contaminate the river water. Would you expect this contamination to persist when it reaches colony B? Give reasons.

Ans. Yes. The contamination will persist when reaches to colony B because it is situated downward. But the concentration of the pollutants will get reduced because the pollutants will get diffused into water.

3. A farmer sprayed pesticides and insecticides in his fields. After some time, he notices that the fish in the nearby pond started dying. State the reason behind dying of fish.

Ans. Pesticides and insecticides added by farmers in fields are washed by rain water into nearby ponds which causes pollution in pond water killing the fish and other aquatic organisms in pond.

4. What will happen if ozone gas is present in the atmosphere?

Ans. Ozone gas is highly poisonous. If it would have been present in the atmosphere, living organisms would not have survived on earth.

5. What will happen if nitrogen fixation does not take place?

Ans. In the absence of nitrogen fixation, atmospheric nitrogen would not be converted to nitrate and nitrite and the soil would be deficient in nitrogen. Healthy plants cannot grow in the absence of nitrogen which will ultimately affect the stability of ecosystem.

6. The government of a state made it mandatory to install rainwater harvesting system and solar water heaters in all buildings in urban areas.

(a) What is the rationale when rainwater already passes into drains?

(b) Why are solar water heaters being installed when electric geysers are available?

(c) What can be the advantages of these changes to the environment?

Ans. (a) Though rainwater passes into drains, it increases the ground water level recharging the well and providing moisture for vegetation over a large area.

(b) Solar water heater absorbs energy from the sun to heat water. This is a clean, economical and renewable source of energy. Electric geysers utilises electrical energy obtained from thermal power plants which is costly, causes pollution and non-renewable.

(c) These changes will reduce air pollution.

Self-Assessment

(Page 114)

Multiple-Choice Questions

1. Oxygen is harmful for

(a) ferns.

(b *Chara*.

(c) nitrogen fixing bacteria.

(d) mango tree.

Ans. (c) nitrogen fixing bacteria.

2. The two molecular forms of oxygen found in the atmosphere are

(a) water and ozone.

(b) water and oxygen.

(c) ozone and oxygen.

(d) water and carbon dioxide.

Ans. (c) ozone and oxygen.

3. In nutrient cycle, mineral tend to be dispersed through

(a) evaporation.

(b) assimilation.

(c) surface and sub-surface run off.

(d) convection.

Ans. (c) surface and sub-surface run off.

4. The most important function of *Rhizobium* is

(a) ammonification. (b) nitrification.

(c) nitrogen fixation. (d) nitrogen assimilation.

Ans. (c) nitrogen fixation.

5. Which of the following is not a greenhouse gas?

(a) Carbon dioxide (b) Water vapour

(c) Methane (d) Ammonia

Ans. (d) Ammonia

Assertion–Reason Type Questions

For question numbers 6 to 13, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both A and R are true and R is the correct explanation of the assertion.

(b) Both A and R are true but R is not the correct explanation of the assertion.

(c) A is true but R is false.

(d) A is false but R is true.

6. Assertion: The outer crust of the earth is called biosphere.

Reason: All water containing part of the earth is called hydrosphere.

Ans. (d)

7. Assertion: There are many ways by which CO_2 can be added to the atmosphere but its concentration in the air remains relatively low.

Reason: The atmospheric CO_2 is fixed by plants during the process of photosynthesis.

Ans. (a)

8. Assertion: During day the direction of wind is from sea to land.

Reason: During night the direction of wind is from land to sea.

Ans. (b)

9. Assertion: Water is an absolute necessity for all living organisms.

Reason: All life processes occur in the liquid medium.

Ans. (a)

10. Assertion: Soil is formed from the weathering of rocks.

Reason: Sun, water, wind and living organisms do not play any role in soil formation.

Ans. (c)

11. Assertion: Desertification is slower in areas where there are more plants.

Reason: Plant roots hold on to the soil and prevent soil erosion.

Ans. (a)

12. Assertion: Mineral flow is cyclic in nature.

Reason: Minerals move between biotic and abiotic components of the ecosystem through biogeochemical cycles.

Ans. (a)

13. Assertion: The surface temperature of the moon ranges from –190 °C to 110 °C.

Reason: The major component of atmosphere on the moon is CO_2.

Ans. (c)

Source-based/Case-based/Passage-based/ Integrated assessment questions

Answer the questions on the basis of your understanding of the following passages and the related studied concepts.

14. Chlorofluorocarbons (CFCs) are man-made compounds which are found in refrigerators and aerosols. They contain both chlorine and fluorine. On reaching the higher levels of the atmosphere, they react with UV radiation and release chlorine atoms that destroy ozone. It leads to the formation of the ozone hole. After the detection of the ozone hole over Antarctica, many countries have signed treaties to restrict the usage of ozone depleting substances.

I. (a) What is the ozone hole?

(b) Name the disease that can be caused by UV radiation.

(c) (i) Where is the ozone layer located?

OR

(ii) How the harmful components of sunlight are prevented from reaching the earth?

Ans. (a) Decline in the thickness of the ozone layer over a restricted area is called the ozone hole.

(b) Skin cancer

(c) (i) Ozone layer is located in the stratosphere.

OR

(ii) Harmful components of sunlight are prevented from reaching the earth by ozone layer.

II. (a) Ozone is a allotropic form of oxygen. It is a

(i) diatomic molecule.

(ii) triatomic molecule.

(iii) tetratomic molecule.

(iv) polyatomic molecule.

Ans. (ii) triatomic molecule.

(b) The harmful UV radiation can cause

(i) cataract. (ii) skin cancer.

(iii) eye damage. (iv) all of these.

Ans. (iv) all of these.

(c) The ozone layer protecting us from UV radiation, is located in the

(i) troposphere. (ii) stratosphere.

(iii) ozonosphere. (iv) ionosphere.

Ans. (ii) stratosphere.

(d) Due to depletion of ozone layer, ozone hole is formed over

(i) troposphere of South pole.

(ii) ozonosphere of North pole.

(iii) stratosphere of South pole.

(iv) troposphere of equatorial region.

Ans. (iii) stratosphere of South pole.

(e) When was the first ozone hole discovered?

(i) 1990s (ii) 1980s

(iii) 1970s (iv) 2000

Ans. (iii) 1970s

15. Environmental pollution is one of the most serious problems we are facing today. It is one of the major cause that affects ecosystem and human health worldwide by contaminating air, soil and water. The major types of environmental pollution includes air, water and soil pollution.

I. (a) What is smog?

(b) Name two methods of controlling gaseous pollutants.

(c) (i) Define environmental pollution.

OR

(ii) Mention the causes of soil pollution.

Ans. (a) Smog is a mixture of smoke, dust particles and small drops of fog formed due to the condensation of water.

(b) Methods of controlling gaseous pollutants are combustion, absorption and adsorption.

(c) (i) Any undesirable change in the physical or biological component of the atmosphere

which cause adverse effect on it is environmental pollution.

OR

(iv) Soil pollution is mainly caused by raw manure, agricultural, industrial and domestic waste.

II. (a) Smog is a mixture of smoke, dust and small drops of fog. It may not cause

(i) necrosis in the leaves of plants.

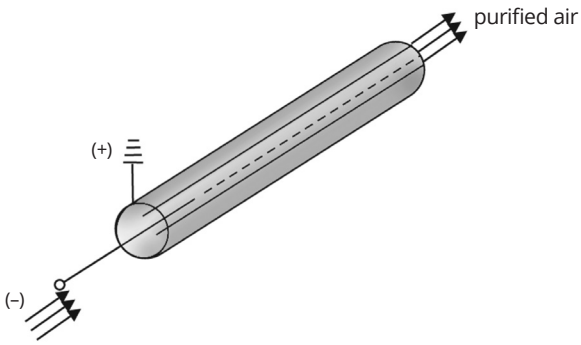
(ii) asthma and allergies to human beings.

(iii) higher visibility in cold weather.

(iv) none of these.

Ans. (iii) higher visibility in cold weather.

(b) Identify the given figure and select the incorrect option from the following.



(i) It is used as a control measure of air pollution.

(ii) It has two electrodes.

(iii) It absorbs gaseous pollutants from the air.

(iv) Air steam containing aerosols is passed within it.

Ans. (iii) It absorbs gaseous pollutants from the air.

(c) Find out the agricultural wastes, causing soil pollution, from the following.

(i) Fly ash, metallic ash

(ii) Chemical fertilizers, pesticides

(iii) Plastic, polythene bags

(iv) Pesticides, glass materials

Ans. (ii) Chemical fertilizers, pesticides

(d) Domestic sewage can majorly cause

(i) soil pollution. (ii) water pollution.

(iii) soil erosion. (iv) all of these.

Ans. (ii) water pollution.

(e) Due to the water pollution, dissolved oxygen level in the water body can be

(i) decreased.

(ii) increased.

(iii) unaffected.

(iv) first increased then decreased.

Ans. (i) decreased.

Very Short Answer Type Questions

16. Name two gases given out by burning of fossil fuels, which dissolve in rain to form acid rain.

Ans. Sulpur dioxide and nitrogen dioxide.

17. How is biosphere dynamic and stable system?

Ans. The biogenic nutrient elements flow from the non-living things to the living ones and then back to the non-living ones in a more or less circular path. A continuous interaction between the biotic and abiotic components of the biosphere makes it a dynamic, but stable system.

18. What is the importance of greenhouse gases present in the atmosphere?

Ans. Greenhouse gases like carbon dioxide or methane content in the atmosphere causes heat to be trapped and retained by the atmosphere.

19. Why do lichens not occur in Mumbai while they occur in Manali and Ooty?

Ans. Lichens are bio-indicators of air pollution. They are highly susceptible to sulphur dioxide present in polluted air which kills the plants. Therefore, they occur in pollution free hill stations like Manali and Ooty rather than in Mumbai and other urban areas which is highly polluted.

20. What is ozone hole?

Ans. A severe depletion of ozone layer of stratosphere caused by the destruction of ozone by CFCs and other ozone depleting substances is known as ozone hole.

21. Why are chlorofluorocarbons considered responsible for depletion of ozone layer? Explain.

Ans. CFCs are very stable molecules. They persist for decades, even centuries, once released. When they diffuse into the atmosphere, they react with the UV radiation from the sun and release chlorine atoms that destroy ozone. This results in the reduction of the ozone layer. Therefore, they are considered responsible for depletion of ozone layer.

22. Explain the role of atmosphere as a blanket. List the factors deciding the rainfall pattern.

Ans. Atmosphere covers the earth like a blanket. Air is a bad conductor of heat. The atmosphere keeps the average temperature of the earth steady during daytime and also around the whole year. It prevents the sudden increase in temperature during daytime. It also slows down the escape of heat into outer space during night and as a result does not let the weather become too cold during night.

Rainfall patterns are decided by the prevailing wind patterns. In major parts of India, rains are mostly brought about by the south-west or north-east monsoons.

23. What is top soil? Mention any two factors that decide which plants will thrive on that soil.

Ans. The topmost layer of the soil which contains humus and living organisms along with soil particles is called the topsoil.

Some of the factors that decide which plants will grow in which type of soil are:

(i) nutrient content of the soil,

(ii) amount of humus present in the soil

24. (a) Name the process that returns oxygen to the atmosphere?

(b) Write the condition responsible for poor visibility in cold weather.

Ans. (a) Photosynthesis.

(b) Presence of high levels of suspended particulate matter and other pollutants may cause lower visibility by formation of smog in cold weather.

Short Answer Type Questions

25. What is biogeochemical cycle? Discuss the basic characteristics of biogeochemical cycle.

Ans. The circulation of matter or biogenic nutrient elements like carbon, hydrogen, oxygen, nitrogen, phosphorus, calcium, water and energy between the biotic (living) world and the abiotic (physical/non-living) world is known as the biogeochemical cycle.

Characteristics of biogeochemical cycle are:

(i) In biogeochemical cycles, materials are not lost but recycled.

(ii) There is regular circulation of biogenic nutrient elements between the abiotic and biotic components of the biosphere.

(iii) It operates through the non-living world (air, water, soil) and the living world.

(iv) Decomposers help in recycling of materials. They convert nutrients into usable forms.

(v) It helps in maintaining the nutrient pool of the earth.

26. (a) What are the different ways in which water gets polluted?

(b) How does it affect life forms?

Ans. (a) Water gets polluted in the following ways:

(i) Fertilisers and Pesticides: Fertilisers and pesticides are used in farms to get higher yields of food crops. These fertilisers and pesticides dissolve in water and are washed into water bodies like lakes and rivers.

(ii) Domestic Sewage: The sewage from our houses is discharged into rivers and lakes.

(iii) Industrial Wastes: Our industries produce a lot of waste containing high concentration of oil, heavy metals and detergents. This waste is dumped into rivers or lakes. There are many industries which use water for cooling process in various operations and later release this hot water to water bodies, which raises their temperature.

(iv) Dams: Water inside deep reservoirs is colder than water at the surface that gets heated due to sun rays. When this water is released from dams, it changes the temperature of water bodies and affects the aquatic life.

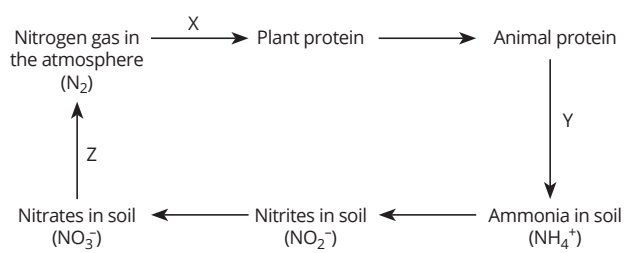
(b) All these activities can affect the life forms found in water bodies. It can encourage the growth of some life forms while affecting the growth of some other life forms available there. This causes an imbalance between various organisms living there.

Long Answer Type Questions

27. (a) How does energy enter the biosphere?

(b) Name one natural and one man-made process by which carbon dioxide returns to the atmosphere.

(c) In the following biogeochemical cycle, name and define the processes marked as X, Y and Z.



Ans. (a) Energy enters the biosphere from the sun by the process of photosynthesis.

(b) Natural process: Respiration;

Man-made process: Combustion.

(c) **X: Nitrogen Assimilation**

The process of conversion of inorganic nitrogen compounds (nitrates obtained from fixing of atmospheric nitrogen) into organic compounds (amino acids, nucleotides, etc.) that become a part of living organisms is called nitrogen assimilation.

Y: Ammonification

The process of conversion of complex organic compounds like proteins of dead and decaying organisms into ammonia is called ammonification.

Z: Denitrification

The conversion (degradation) of nitrate and nitrite salts to elemental nitrogen is called denitrification.

28. (a) Give reasons for the following:

(i) Presence of high levels of suspended particles in the air is harmful.

(ii) Sudden change in temperature of water body is dangerous for aquatic life.

(iii) Nitrogen cycle is said to be a perfect cycle.

(b) What happens to nitrates once it enters the plants?

(c) State the role of photosynthesis and respiration in oxygen cycle in nature.

Ans. (a)

(i) Presence of high levels of suspended particulate matter in air may cause lower visibility, especially in cold weather. It may cause necrosis and develop a white coating on the leaves of plants. In human beings and animals, it may cause asthma and allergies. Therefore, it is harmful.

(ii) Aquatic organisms can survive well up to a certain range of temperature. A sudden change in this temperature may be dangerous for these organisms or affect their breeding. The eggs and larvae of various organisms are particularly susceptible to temperature changes, which cannot survive a drastic change in temperature.

(iii) Nitrogen cycle is called a perfect cycle in the biosphere because nitrogen cycle depends upon different kinds of bacteria like nitrifiers, denitrifiers, and nitrogen fixers and keeps or maintains the overall amount of nitrogen constant in atmosphere, soil and water.

(b) Plants absorb nitrogen from the soil in the form of nitrate and convert it to plant protein. This process of conversion of inorganic nitrogen compounds into organic compounds that become a part of living organisms is called nitrogen assimilation.

(c) Oxygen enters the living or biotic world through the process of respiration, in which energy is released from the food material. However, oxygen is returned to the atmosphere by autotrophs during photosynthesis. The concentration of oxygen in the air and water is maintained since the rate of its release during photosynthesis and use during respiration remain almost the same.

Let's Compete

(Page 116)

Multiple-Choice Questions

1. The microorganisms which help in soil formation is

(a) bacteria. (b) moss.

(c) lichen. (d) both (b) and (c).

Ans. (d) both (b) and (c).

2. Nitrogen fixation can be done by

(a) industries. (b) *rhizobium.*

(c) lightning. (d) all of these.

Ans. (d) all of these.

3. Molecules of protein contain

(a) carbon. (b) nitrogen.

(c) oxygen. (d) all of these.

Ans. (d) all of these.

4. Atmosphere maintains the temperature of the earth because

(a) it contains water vapour.

(b) it hold air which is bad conductor of heat.

(c) it reflects the heat rays.

(d) it absorbs the heat rays.

Ans. (d) it absorbs the heat rays.

5. Which type of soil is rich in loam and clay?

(a) Black soil (b) Alluvial soil

(c) Laterite soil (d) Desert soil

Ans. (b) Alluvial soil

6. The ozone layer blocks the

(a) infrared radiation. (b) sunlight.

(c) UV rays. (d) none of these.

Ans. (c) UV rays.

7. Greenhouse effect is caused by

(a) green plants. (b) infrared rays.

(c) UV rays. (d) X rays.

Ans. (b) infrared rays.

8. Which is the major source of formation of soil?

(a) River beds (b) Glaciers

(c) Rocks (d) Volcanoes

Ans. (c) Rocks

9. Which of the following processes is not involved in the carbon cycle?

(a) Photosynthesis (b) Burning of fossil fuels

(c) Transpiration (d) Respiration

Ans. (c) Transpiration

10. Bacteria drives the

(a) nitrogen cycle. (b) oxygen cycle.

(c) carbon cycle. (d) water cycle.

Ans. (a) nitrogen cycle.

Life Skills

(Page 117)

1. Pratap lives in a village with no electricity. People of the village use kerosene lamps for lighting their houses. He discovered that many a times, these kerosene lamps continue to lit in the rooms while sleeping. He called a meeting of the villagers and informed them about the ill effects of the smoke. He also wrote to the authorities for electrification of the village.

(a) What values are shown by Pratap?

(b) What are the ill effects of burning of kerosene on human health?

Ans. (a) Values shown by Pratap are awareness, community service and social responsibility.

(b) Kerosene lamps emit fine particulates, carbon monoxide, nitric oxides, and sulphur dioxide when burned. These by-products may cause carbon monoxide poisoning, reduce lung function and increase risks of asthma and cancer.

2. In an industrial area, many people were suffering from various airborne diseases. On study, it was found that the concentration of CO_2, NO_2, SO_2 and fly ash were more than normal in the area.

(a) What types of industries may be located in that area?

(b) How will the emission from these industries affect the people living in that area?

(c) Suggest measures to protect the health of the people living in the area.

Ans. (a) CO_2, NO_2, SO_2 and fly ash are produced from the combustion of coal. Therefore a coal based thermal power plant may be located in the area.

(b) These pollutants affect the health of the people living in the area adversely. It may cause respiratory disease like asthma, bronchitis, lung cancer, etc. Non metal oxides like CO_2, NO_2, SO_2 causes acid rain which may also affect the crops growing in the area.

(c) They should wear mask to protect themselves from harmful effect of these gases and particulate matter.

3. Rakesh was standing at a bus stop waiting for the bus. He saw a bus that was emitting black smoke. He immediately stopped the bus and showed the driver the smoke emitted by the bus.

(a) What values were shown by Rakesh through his action?

(b) How does vehicle exhaust affect our health?

(c) Why are catalytic converters fitted in vehicle exhausts?

Ans. (a) Values shown by Rakesh are awareness, ecofriendliness and health consciousness.

(b) Vehicle exhaust produces smoke, particulate matter and harmful gases like carbon dioxide, carbon monoxide, sulphur dioxide and oxides of nitrogen which adversely affect our health. It may cause respiratory disease like asthma, bronchitis, lung cancer, etc.

(c) Catalytic converters are used in automobiles to reduce the emission of poisonous gases. They convert unburnt hydrocarbons to carbon dioxide and water; carbon monoxide and nitrogen dioxide are converted to carbon dioxide and nitrogen gas respectively.