6 Tissues

Fastrack Revision

- **Tissues:** A group of cells that are similar in structure, arranged and designed to give the highest possible efficiency of function at a definite place in the body, *e.g.*, blood, phloem and muscles.

  In unicellular organisms like *Amoeba*, single cell performs all basic functions whereas in multicellular organisms like plants and animals, division of labour is seen, *i.e.*, each specialised function is taken up by a different group of cells (tissues).

Knowledge BOOSTER

Study of tissues is called Histology.

- **Plant Tissues:** Plants show two main types of tissues on the basis of their dividing capacity—meristematic tissue and permanent tissue.
  - **Meristematic Tissue:** It is the tissue having the power of cell division and is found in those regions of the plant which grow. So, they are called growth tissues. Cells of meristematic tissue are very active, have dense cytoplasm, thin cellulose walls, prominent nuclei and lack vacuoles.
    - **Types of Meristematic Tissues:**
      - **Apical Meristem:** It is present at the growing tip of the stem and roots and increases the length of the stem and the root.
      - **Lateral Meristem:** It is present at the lateral side of stem and root (cambium) and increases the girth of stem or root.
      - **Intercalary Meristem:** It is present at internodes or base of the leaves and increases the length between the nodes.
  - **Permanent Tissue:** It is formed from the cells of meristematic tissue when they loose their ability to divide and have attained a permanent shape, size and function by the process called differentiation.
    - **Types of Permanent Tissue:** Permanent tissues are of two types-simple permanent tissue and complex permanent tissue.
    - **Simple Permanent Tissue:** It is made up of only one type of cells, those are similar in structure and function. They are of three types—Parenchyma, Collenchyma and Sclerenchyma.
      - **(i) Parenchyma:** They are living cells with thin cell walls. They are loosely packed and have large intracellular space. They generally stores food.
      - **(ii) Collenchyma:** These tissues provide mechanical support, cells are living, elongated, thickened at the corners and have very little intercellular space. It allows easy bending of various parts of plant without breaking.
      - **(iii) Sclerenchyma:** This tissue makes the plant hard and stiff, cell walls are thickened due to lignin and have no intercellular space. Cells of this tissue are dead, long and narrow. This tissue is present in stems, veins of leaves and in hard coverings of seeds and nuts. It also provides strength to plant parts.

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The cells of parenchyma and collenchyma tissues are living whereas cells of sclerenchyma are dead.
Parenchyma with chlorophyll which performs photosynthesis is called chlorenchyma.
Parenchyma with large air cavities that give buoyancy to aquatic plants is called aerenchyma.

- **Complex Permanent Tissue:** This tissue is made up of more than one type of cells which coordinate to perform a common function. They are of two types—Xylem and Phloem.
  - **(i) Xylem:** It consists of tracheids, vessels, xylem parenchyma and xylem fibres. Tracheids and vessels are tabular structures, have thick walls and are also dead cells. They help in the conduction of water and minerals vertically. The parenchyma stores food and xylem fibres are mainly supportive in function.
  - **(ii) Phloem:** It is a conducting tissue which transports food from leaves to other parts of the plant in both directions. It consists of sieve cells, sieve tubes, companion cells, phloem parenchyma and phloem fibres. Except phloem fibres, other phloem cells are living cells.

- **Protective Tissues:** These tissues provide protection to the plants from extra loss of water and are of three types— epidermis guard cells and cork.
  - **(i) Epidermis:** This is the outermost single layer of plant cells which protects all the plant parts. The cells of epidermal tissue form a continuous layer without intercellular spaces due to its protective role. Epidermal cells on the aerial parts of the plant often secrete a waxy, water-resistant layer on their outer surface which aids in protection against loss of water, mechanical injury and invasion by parasitic fungi.

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The epidermal tissues in desert plants have a thick waxy coating of cutin with waterproof quality to prevent water loss.

(ii) Guard Cells: The epidermal layer consists of small pores called stomata which are surrounded by kidney-shaped guard cells. They aid in exchange of gases with the atmosphere and in the process of transpiration.

(iii) Cork: It is a layer of secondary meristem that replaces the epidermal layer. Its cells are dead and compactly arranged without intercellular spaces. A chemical called suberin is present in their walls that makes them impervious to gases and water.

- **Animal Tissues:** These tissues can be subdivided into four groups on the basis of functions that they perform: epithelial tissue, connective tissue, muscular tissue and nervous tissue.
  - **Epithelial Tissue:** It is a protective tissue whose cells are tightly packed and form a continuous sheet. It acts as a barrier to keep the different body systems separate from each other. It play an important role in regulating the exchange of materials between the body and the external environment and also between different parts of the body. Based on the shape of cells and their arrangements, epithelial tissues are of six types:
    - **Simple Squamous Epithelium:** One which is extremely thin and flat, *e.g.*, oesophagus, lining of mouth, living of blood vessels and lung alveoli compounds.
    - **Stratified Squamous Epithelium:** It is arranged in pattern of layers, to prevent wear and tear, *e.g.*, outer side of skin.
    - **Columnar Epithelium:** These are much taller than width and pillar-like, *e.g.*, inner lining of intestine.
    - **Ciliated Columnar Epithelium:** The cells possess cilia *i.e.*, hair-like projections, *e.g.*, respiratory tract, lining of oviducts, sperm ducts, etc.
    - **Cuboidal Epithelium:** These are cube-shaped, *e.g.*, lining of kidney tubules and ducts of salivary glands.
    - **Glandular Epithelium:** This aids in a special function as gland cells which can secrete at the epithelial surface.
  - **Connective Tissue:** This tissue connects various body organs with each other such as muscles to bones.

    Types of Connective Tissue: Connective tissue are of various types—Bone, cartilage, tendon, ligament, blood, areolar and adipose connective tissue.

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Matrix forms the main bulk of connective tissue and may be jelly like, fluid, dense or rigid.

- **Bone:** It is a connective tissue whose cells are embedded in a hard matrix composed of calcium and phosphorus. It is a strong and non-flexible tissue which anchors the muscles and supports the main organs of the body.
- **Cartilage:** It is a connective tissue with solid matrix composed of proteins and sugars. It is commonly seen in nose, ear, trachea and larynx. It has widely spaced cells and smoothens bone surfaces at joints.
- **Tendon:** It is a fibrous tissue with great strength but limited flexibility, joining skeletal muscles to bones.
- **Ligament:** It is an elastic tissue joining two or more bones and contains very little matrix.
- **Blood:** It is a fluid connective tissue. Blood plasma has RBCs (Red Blood Cells), WBCs (White Blood Cells) and platelets. It also contains proteins, salts and hormones. Blood flows and transports gases, digested food, hormones and waste materials.

Knowledge BOOSTER

Blood plasma is the non-living part of the blood and is composed of 92% water, 7% proteins, 0.9% salts and 0.1% glucose.

- **Areolar Connective Tissue:** It is found between the skin and muscles, around the blood vessels and nerves and in the bone narrow. It supports internal organs and aids in repair of tissues.
- **Adipose Connective Tissue:** It is a fat reservoir and is found below the skin and between internal organs. It acts as an insulator.

- **Muscular Tissues:** These are composed of elongated cells called as muscle fibres. They have special contractile proteins responsible for movements.

  Types of Muscular Tissue: Muscular tissues are of three types—Striated muscles, unstriated muscles and cardiac muscles.
  - **Striated Muscles:** They are skeletal or voluntary muscles which are long, cylindrical, unbranched and multinucleated. They have alternate dark and light bands. They help in body movement, *e.g.*, muscles present in our limbs.
  - **Unstriated Muscles:** They are smooth or involuntary muscles having no striations (no dark or light bands). They are commonly found in alimentary canal, ureters, bronchi of lungs, iris of an eye. They are spindle-shaped and uninucleate.
  - **Cardiac Muscles:** They are commonly called heart muscles and are cylindrical, branched and uninucleate. They have stripes of light and dark bands and are found in the walls of heart and involuntary in nature.
- **Nervous Tissue:** This tissue controls all the activities of the body and responds to stimuli. The brain, spinal cord and nerves are composed of nervous tissue. The cells of this tissue are called nerve cells or neurons. A neuron consists of cell body, cytoplasm, nucleus, dendrite, axon, nerve ending. Nerve impulse allows us to move our muscles when we want to respond to stimuli.

Knowledge BOOSTER

Both nerve and muscle tissues help in rapid movements in response to stimuli in animals.

Practice Exercise

Multiple Choice Questions

Q 1. Find out the incorrect sentence. *(NCERT EXEMPLAR)*

a. Parenchymatous tissues have intercellular spaces.
b. Collenchymatous tissues are irregularly thickened at corners.
c. Apical and intercalary meristems are permanent tissues.
d. Meristematic tissues, in its early stage, lack vacuoles.

Q 2. 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: *(NCERT EXEMPLAR)*

a. cambium
b. apical meristem
c. lateral meristem
d. intercalary meristem

Q 3. Refer to the given figure and select the incorrect option regarding regions *X*, *Y* and *Z*.

a. The given figure shows the locations of growing tissues in plants.
b. The tissue *X* is responsible for the increase in the length of stem and root.
c. Out of the three tissues, only cells of tissue *Y* are very active with dense cytoplasm and thin cell walls.
d. The girth of the stem and the root increases due to Z.

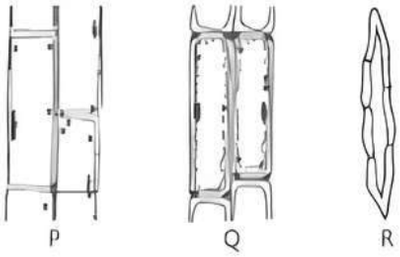
Q 4. ..... is not an example of simple permanent tissue.

a. Parenchyma
b. Collenchyma
c. Sclerenchyma
d. Phloem

Q 5. Flexibility in plants is due to: *(NCERT EXEMPLAR)*

a. collenchyma
b. sclerenchyma
c. parenchyma
d. chlorenchyma

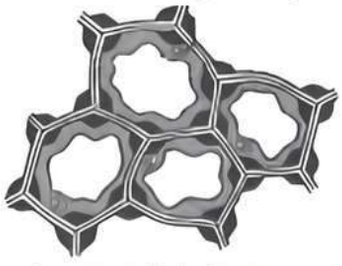
Q 6. Refer to the given figures (*P*, *Q* and *R*) showing three sections of simple permanent tissues.



Identify the tissues shown in figure, *P*, *Q* and *R* and select the correct option regarding them.

	P	Q	R
a.	Sclerenchyma	Parenchyma	Collenchyma
b.	Collenchyma	Parenchyma	Sclerenchyma
c.	Parenchyma	Sclerenchyma	Collenchyma
d.	Parenchyma	Collenchyma	Sclerenchyma

Q 7. The tissue shown in the given figure is:

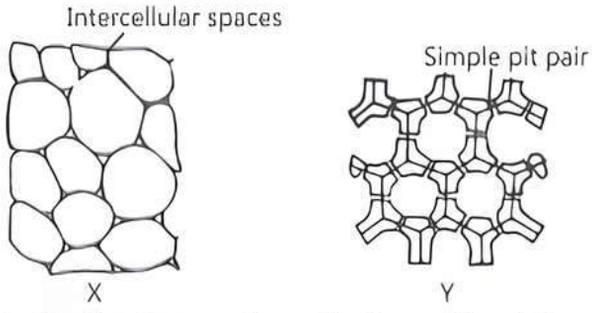


a. collenchyma, which is present in leaf stalks below the epidermis.
b. sclerenchyma, which is present in hard coverings of seeds and nuts.
c. xylem fibres which are mainly supportive in function.
d. phloem parenchyma with abundant food reserve.

Q 8. A tissue which makes up the husk of coconut and whose cells are dead, elongated and lignified is:

a. chlorenchyma
b. collenchyma
c. parenchyma
d. sclerenchyma

Q 9. Refer to the given figures showing transverse sections of two plant tissues (*X* and *Y*).



Identify the tissues shown in figure, *X* and *Y* and select the correct option regarding them.

a. The cells of tissue *X* are live; while the cells of tissue *Y* are dead.
b. The cells of tissue *X* are thickened due to lignin while cells of tissue *Y* have thin cells walls.
c. There are large intercellular spaces in both the tissues *X* and *Y*.
d. The tissue *X* provides strength to the plant parts whereas the tissue *Y* allows flexibility in plant parts.

Q 10. The dead element present in the phloem is: *(NCERT EXEMPLAR)*

a. companion cells
b. phloem fibres
c. phloem parenchyma
d. sieve tubes

Q 11. Which is not a function of epidermis? *(NCERT EXEMPLAR)*

a. protection from adverse condition
b. gaseous exchange
c. conduction of water
d. transpiration

Q 12. In desert plants, rate of water loss gets reduced due to the presence of: *(NCERT EXEMPLAR)*

a. cuticle b. stomata c. lignin d. suberin

Q 13. Cork cells are made impervious to water and gases by the presence of: *(NCERT EXEMPLAR)*

a. cellulose b. lipids
c. suberin d. lignin

Q 14. A long tree has several branches. The tissue that helps in the sideways conduction of water in the branches is:

a. collenchyma b. xylem parenchyma
c. xylem tracheids d. xylem vessels

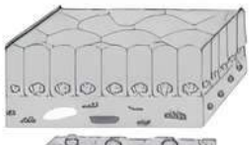
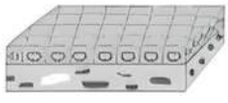
Q 15. Which type of tissue forms glands?

a. Connective b. Epithelial
c. Nervous d. Muscle

Q 16. Intestine absorb the digested food materials. What type of epithelial cells are responsible for that? *(NCERT EXEMPLAR)*

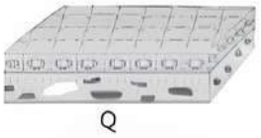
a. Stratified squamous epithelium
b. Columnar epithelium
c. Spindle fibres
d. Cuboidal epithelium

Q 17. Which of the following epithelial tissues, lines the respiratory tract?

a. 
b. 
c. 
d. 

Q 18. The given figures show two types of epithelial tissue (*P* and *Q*). Select the correct option regarding them.


P


Q

a. *P* and *Q* are simple squamous epithelial tissue and stratified squamous epithelium respectively.
b. The cells in epithelium *Q* are arranged in many layers to prevent wear and tear.
c. Epithelium *P* lines blood vessels and lung alveoli where exchange of substances occurs.
d. Epithelium *Q* lines kidney tubules and ducts of salivary glands where it provides mechanical support.

Q 19. Ligament is very elastic because:

a. it attaches bone to bone.
b. it is densely packed.
c. it contains very little matrix.
d. Both b. and c.

Q 20. Cartilage is not found in:

a. nose b. ear
c. kidney d. larynx

Q 21. Which of the following tissue acts like an insulator?

a. Adipose connective tissue
b. Lymph
c. Epithelial tissue
d. Areolar connective tissue

Q 22. Select the incorrect sentence. *(NCERT EXEMPLAR)*

a. Blood has matrix containing proteins, salts and hormones.
b. Two bones are connected with ligament.
c. Tendons are non-fibrous tissue and fragile.
d. Cartilage is a form of connective tissue.

Q 23. Which of the following helps in repair of tissue and fills up the space inside the organ? *(NCERT EXEMPLAR)*

a. Tendon b. Adipose tissue
c. Areolar d. Cartilage

Q 24. Cylindrical muscle fibres which show alternate light and dark bands are:

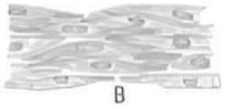
a. smooth muscle b. cardiac muscle fibres
c. tendons d. skeletal muscles

Q 25. Voluntary muscles are found in: *(NCERT EXEMPLAR)*

a. alimentary canal b. limbs
c. iris of the eye d. bronchi of lungs

Q 26. Identify the figures *A*, *B* and *C* showing different types of muscle and select the correct option regarding them.


A


B


C

	A	B	C
a.	Smooth muscle	Striated muscle	Cardiac muscle
b.	Cardiac muscle	Smooth muscle	Striated muscle
c.	Striated muscle	Smooth muscle	Cardiac muscle
d.	Involuntary muscle	Voluntary muscle	Heart muscle

Q 27. Which muscles act involuntarily? *(NCERT EXEMPLAR)*

(i) Striated muscles
(ii) Smooth muscles
(iii) Cardiac muscles
(iv) Skeletal muscles

a. (i) and (ii) b. (ii) and (iii)
c. (iii) and (iv) d. (i) and (iv)

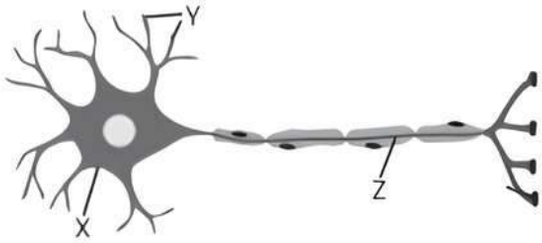
Q 28. Skeletal muscles are:

a. striated and voluntary
b. unstriated and voluntary
c. striated and involuntary
d. unstriated and involuntary

Q 29. Short branched process coming out of a neuron are:

a. dendrites b. axons
c. neutrophils d. boutons

Q 30. **The given figure shows a neuron with its parts labelled as *X*, *Y* and *Z*.**



Select the incorrect option regarding the structures of the neuron.

a. *X* is cell body having nucleus and cytoplasm.
b. *Y* are dendrites which branch from cell body.
c. *Z* is an axon which is a cylindrical process arising from *X*.
d. *Y* carry impulses away from cell body whereas *Z* receives impulses.

Assertion & Reason Type Questions

Directions (Q. Nos. 31-40): *Each of the following questions consists of two statements, are Assertion (A) and the other is Reason (R). Select the correct answer to these questions from the codes (a) (b) (c) and (d) as given below:*

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

Q 31. **Assertion (A):** Tissues give the highest possible efficiency of function.
Reason (R): Tissues bring about division of labour in multicellular organisms.

Q 32. **Assertion (A):** Growth of plants is restricted to certain specific regions.
Reason (R): Plants have a large quantity of supportive tissue which is mostly made of dead cells.

Q 33. **Assertion (A):** Meristematic tissues constitute the major portion of plant body.
Reason (R): Meristematic tissues, after differentiation, give rise to permanent tissues.

Q 34. **Assertion (A):** Permanent tissue are derived from meristematic tissue when they lose the ability to divide.
Reason (R): Meristematic tissue is the dividing tissue in the growing regions of the plant.

Q 35. **Assertion (A):** It is difficult to pull out the husk of a coconut tree.
Reason (R): Husk of a coconut tree has sclerenchyma cells having thick walls.

Q 36. **Assertion (A):** There is no intercellular space between the cells of epidermal layer.
Reason (R): The epidermal layer consists of stomata that performs the function of gaseous exchange and transpiration.

Q 37. **Assertion (A):** Epithelial tissue acts as a barrier to keep the different body systems separate from each other.
Reason (R): Epithelial tissue provides a supporting framework to the body.

Q 38. **Assertion (A):** Surface of skin is impervious to water.
Reason (R): Surface of skin is covered by cuboidal epithelium.

Q 39. **Assertion (A):** Bone cells are embedded in a hard matrix.
Reason (R): The matrix found in our body may be jelly like, fluid, dense or rigid.

Q 40. **Assertion (A):** Smooth muscles are spindle-shaped and uninucleate.
Reason (R): They are found in the iris of the eye, in ureters and in the bronchi of the lungs.

Answers

1. (c) Apical and intercalary meristems are meristematic tissues.
2. (d) Intercalary meristem
   If the tip of sugarcane plant is removed the apical meristem is also removed as it is present at the growing tips of stems and roots.
   Sugarcane keeps on growing due to the presence of intercalary meristem near the node.
3. (c) One of the three tissues, only cells of tissue *Y* are very active with dense cytoplasm and thin cell walls.
   X, *Y*, *Z* are growing or meristematic tissues. *X* is apical meristem, *Y* is intercalary meristem and *Z* is lateral meristem.
   The cells of all these tissues are very active have dense cytoplasm, thin cellulose walls and prominent nuclei.
4. (d) Phloem
   Phloem is an example of complex permanent tissues.
5. (a) collenchyma
6. (d) P-Parenchyma, Q-Collenchyma, R-Sclerenchyma
7. (a) collenchyma, which is present in leaf stalks below the epidermis.
8. (d) sclerenchyma
9. (a) The cells of tissue *X* are live; while the cells of tissue *Y* are dead.
   X is parenchyma and *Y* is sclerenchyma tissue. Cells of sclerenchyma (*Y*) are thickened due to lignin and has thick cell walls.
   There is no intercellular space in sclerenchyma (*Y*). Sclerenchyma (*Y*) provides strength to plant parts.
10. (b) phloem fibres
11. (c) conduction of water
12. (a) cuticle

13. (c) suberin
14. (b) Xylem parenchyma
    Xylem parenchyma stores food and helps in the sideways conduction of water.
15. (b) Epithelial
16. (b) Columnar epithelium
17. (c) 
    Ciliated columnar epithelium lines the respiratory tract.
18. (c) Epithelium *P* lines blood vessels and lung alveoli where exchange of substances occurs.
19. (c) It contains very little matrix.
20. (c) Kidney
    Cartilage is present in nose, ear, larynx and trachea.
21. (a) Adipose connective tissue
22. (c) Tendons are non-fibrous tissue and fragile.
    Tendons are fibrous tissues.
23. (c) Areolar
24. (d) skeletal muscles
25. (b) limbs
26. (c) A-Striated muscle, B-Smooth muscle, C-Cardiac muscle
27. (b) (ii) and (iii)
28. (a) striated and voluntary
29. (a) dendrites
30. (d) Y carry impulses away from cell body whereas Z receives impulses.
    X-Cell body, Y-Dendrites, Z-Axon
    Dendrites (Y) receive impulses and axon (Z) carries impulses away from cell body to other neurons.
31. (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
32. (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
33. (d) Assertion (A) is false but Reason (R) is true.
    Permanent tissues constitute the major portion of plant body.
34. (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
35. (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
36. (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
37. (c) Reason (R) is false because Bones provides a supporting framework to the body.
38. (c) Reason (R) is false because Surface of skin is covered by stratified squamous epithelium.
39. (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
40. (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

Case Study Based Questions

Case Study 1

The term meristem was coined by Carl Wilhelm von Nageli in 1858. Meristematic tissues are the cells or groups of cells that have the ability to divide. These cells divide continuously and thus helps in increasing the length and thickness of the plant. These cells continue to divide until a time when they get differentiated and then lose the ability to divide. Meristematic tissue is also called growing tissue. The cells of this tissue are very active, have dense cytoplasm, thin cellulose walls and prominent nuclei. They lack vacuoles.

Read the given passage carefully and give the answer of the following questions:

Q 1. Which meristem helps in increasing the girth of the plant?
a. Primary meristem b. Apical meristem
c. Intercalary meristem d. Lateral meristem

Q 2. Which of the following statements given below is correct about meristematic tissue?
a. It is made of cells that are incapable of cell division.
b. It is made of cells that are capable of cell division.
c. It is composed of single type of cells.
d. It is composed of more than one type of cell.

Q 3. Meristematic cells are characterised by:
a. thin cell walls and many vacuoles
b. thin cell walls and no vacuoles
c. thick cell walls and many vacuoles
d. thick cell walls and no vacuoles

Q 4. The meristem present at the base of the internode is:
a. lateral meristem b. apical meristem
c. intercalary meristem d. All of these

Q 5. Read the following statements regarding meristematic tissues and select the correct ones.
(i) These tissues are localised in certain specific regions.
(ii) Cells of meristematic tissue have dense cytoplasm with prominent nucleus.
(iii) Differentiation leads to the development of various types of meristematic tissues.
a. (i) and (ii) b. (ii) and (iii)
c. (i) and (iii) d. (i), (ii) and (iii)

Answers

1. (d) Lateral meristem
2. (b) It is made of cells that are capable of cell division.
3. (b) thin cell walls and no vacuoles.
4. (c) Intercalary meristem
5. (a) (i) and (ii)

Case Study 2

The permanent tissues in a plant are those tissues that contain non-dividing cells. The cells are also modified to perform specific functions in the

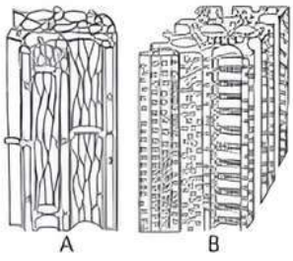
plants. The cells of the permanent tissue are derived from the meristematic tissue. The permanent tissue in plants mainly helps in providing support, protection as well as in photosynthesis and conduction of water, minerals and nutrients. Permanent tissue cells may be living or dead.

Read the given passage carefully and give the answer of the following questions:

Q 1. Which of the following are simple permanent tissues?

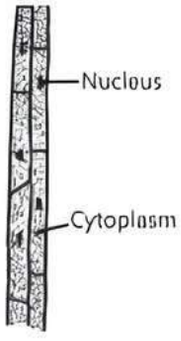
a. Parenchyma, xylem and phloem
b. Parenchyma, collenchyma and sclerenchyma
c. Parenchyma, xylem and sclerenchyma
d. Parenchyma, phloem and sclerenchyma

Q 2. Identify *A* and *B* in the given diagram.



a. A-xylem, B-phloem
b. A-parenchyma, B-sclerenchyma
c. A-phloem, B-xylem
d. A-phloem, B-parenchyma

Q 3. Identify the type of cell in the given diagram.



a. Xylem parenchyma
b. Companion cells
c. Tracheids
d. Vessels

Q 4. Parenchyma cells are:

a. relatively unspecified and thin walled
b. thick walled and specialised
c. lignified
d. None of the above

Q 5. Survival of plants in terrestrial environment has been made possible by the presence of:

a. intercalary meristem
b. conducting tissue
c. apical meristem
d. parenchymatous tissue

Answers

1. (b) Parenchyma, collenchyma and sclerenchyma
2. (c) A-phloem, B-xylem
3. (a) Xylem parenchyma
4. (a) relatively unspecified and thin walled
5. (b) conducting tissue

Case Study 3

The term 'Connective Tissue' was introduced in 1830 by Johannes Peter Müller. Connective tissue is one of the many basic types of animal tissue, along with epithelial tissue, muscle tissue and nervous tissue. As the name implies, they support and connect different tissues and organs of the body. They are widely distributed in every part of the body. The cells of connective tissue are loosely spaced and embedded in an intercellular matrix. The matrix may be jelly like, fluid, dense or rigid. The nature of matrix differs in concordance with the function of the particular connective tissue.

Read the given passage carefully and give the answer of the following questions:

Q 1. Which of the following is not a type of WBC?

a. Neutrophils
b. Eosinophils
c. Basophils
d. Erythrocytes

Q 2. Bone and cartilage are types of:

a. nervous tissues
b. muscle tissues
c. connective tissues
d. epithelial tissues

Q 3. Match the type of connective tissues listed under Column I with the functions listed under Column II. Choose the choice, which gives the correct combination of the alphabets of the two columns.

Column I (Connective Tissues)	Column II (Functions)
A. Ligament	(I) Stores fat
B. Tendons	(II) Connects bone to bone
C. Areolar tissue	(iii) Connects muscle to bone
D. Adipose tissue	(iv) Forms blood cells
	(v) Filling tissue

a. A-(ii), B-(iii), C-(v), D-(I)
b. A-(II), B-(iv), C-(v), D-(I)
c. A-(II), B-(III), C-(v), D-(iv)
d. A-(ii), B-(iii), C-(I), D-(iv)

Q 4. Bone matrix is rich in:

a. fluoride and calcium
b. calcium and phosphorus
c. calcium and potassium
d. phosphorus and potassium

Q 5. A person met with an accident in which two long bones of hand were dislocated. Which among the following may be the possible reason?

a. Tendon break
b. Break of skeletal muscle
c. Ligament break
d. Areolar tissue break

Answers

1. (d) Erythrocytes
2. (c) connective tissues
3. (a) A-(ii), B-(iii), C-(v), D-(I)
4. (b) calcium and phosphorus
5. (c) Ligament break

Case Study 4

Epithelial tissue or epithelium forms the outer covering of the skin and also lines the body cavity. It forms the lining of respiratory, digestive, reproductive and excretory tracts. They perform various functions such as absorption, protection, sensation and secretion. Epithelial tissue cells are tightly packed and form a continuous sheet. They have only a small amount of cementing material between them and almost no intercellular spaces. Epithelial cells may be squamous, cuboidal or columnar in shape and may be arranged in single or multiple layers.

Read the given passage carefully and give the answer of the following questions:

Q 1. Name the tissue present under the skin and arranged in a pattern of layers.
Q 2. Name any one location in our body which bears ciliated epithelium.
Q 3. Name the epithelial tissue which has pillar-like tall cells.
Q 4. State how the epithelium is separated from the underlying tissue.
Q 5. Write a short note on epithelial tissue cells.

Answers

1. Stratified squamous epithelium
2. Respiratory tract
3. Columnar epithelium
4. Epithelium is separated from underlying tissue by an extracellular fibrous basement membrane.
5. Epithelial tissue cells are tightly packed and forms a continuous sheet. They have no intercellular spaces.

Case Study 5

Muscular tissue is a specialised tissue in animals which applies forces to different parts of the body by contraction. It is made up of thin and elongated cells called muscle fibers. It controls the movement of an organism. In mammals the three types are: skeletal or striated muscle tissue, smooth muscle (non-striated) muscle; and cardiac muscle. Skeletal muscle tissue consists of elongated muscle cells called muscle fibers, and is responsible for movements of the body. Smooth and cardiac muscle contract involuntarily, without conscious intervention. Striated or skeletal muscle only contracts voluntarily, upon the influence of the central nervous system.

Read the given passage carefully and give the answer of the following questions:

Q 1. Write two features of cardiac muscles.
Q 2. Which muscle has spindle-shaped cells?
Q 3. Why are smooth muscles called involuntary muscles?
Q 4. Name the protein present in muscle fibre.
Q 5. Why striated muscles are called as voluntary muscles?

Answers

1. Two features of cardiac muscles are:
   (i) They are cylindrical branched and uninucleate.
   (ii) They are involuntary in nature and show rhythmic contraction and relaxation throughout life.
2. Smooth muscles.
3. They are involuntary as their functioning cannot be directly controlled.
4. Contractile protein, which contract and relax to cause movement.
5. Striated muscles are under our conscious control and their movement can be controlled by us (*e.g.* Bicep muscles), unlike as in the case of involuntary muscles, hence they are called voluntary muscles.

Very Short Answer Type Questions

Q 1. What is a tissue? *(NCERT INTEXT)*

Ans. A group of cells that are similar in structure and work together to achieve a particular function is called a tissue.

Q 2. Where is apical meristem found? *(NCERT INTEXT)*

Ans. Apical meristem is found at the growing tips of stems and roots of plants.

Q 3. What does the root tip contain that helps in root elongation?

Ans. The root tip contains apical meristematic tissue which increases the length of the root.

Q 4. Name types of simple tissues. *(NCERT INTEXT)*

Ans. Types of simple tissues are parenchyma, collenchyma and sclerenchyma.

Q 5. Name the tissue which allows easy bending in various parts of a plant.

Ans. Collenchyma

Q 6. Name the tissue which is present in the veins of leaves.

Ans. Sclerenchyma

Q 7. Aquatic plants float in water. Give reason for this fact.

Ans. Due to the presence of aerenchyma. It stores gases and provides buoyancy to aquatic plants and helps them float over water.

Q 8. How is permanent tissue formed from meristematic tissue?

Ans. When the meristematic tissue cells take up a specific role and lose their ability to divide, permanent tissues are formed.

Q 9. Which process in meristematic tissue converts it to permanent tissue?

Ans. Differentiation is the process by which meristematic tissue takes up a permanent shape, size and function.

Q 10. Which structure protects the plant body against the invasion of parasites? *(NCERT EXEMPLAR)*

Ans. The cuticle covering the epidermis protects the plant body against the invasion of parasites.

Q 11. What is the function of cutin, the waxy substance present in epidermis of desert plants?

Ans. Cutin checks the loss of water in desert plants.

Q 12. Why are cork impervious to gases and water?

Ans. Cork is impervious to gases and water due to a substance called suberin in its walls.

Q 13. Name the complex plant tissues.

Ans. Xylem and phloem are complex plant tissues.

Q 14. How many types of elements together make up the xylem tissue? Name them. *(NCERT EXERCISES)*

Ans. Four types of elements together make up the xylem tissue. They are : tracheids, vessels, xylem parenchyma and xylem fibres.

Q 15. Which type of conducting tissues conduct water and minerals vertically?

Ans. Tracheids and vessels of xylem are the two conducting tissues that conduct water and minerals vertically.

Q 16. What are the constituents of phloem? *(NCERT INTEXT)*

Ans. Phloem is made up of sieve cells, sieve tubes, companion cells, phloem fibres and phloem parenchyma.

Q 17. Identify the following:

(i) Living component of xylem

(ii) Dead element of phloem

Ans. (i) Xylem parenchyma

(ii) Phloem fibres

Q 18. Name the most abundant tissue in animals.

Ans. Connective tissue is the most abundant tissue in animals.

Q 19. Which biochemicals compose the solid matrix of cartilage?

Ans. The solid matrix is composed of proteins and sugars.

Q 20. Blood, bone, ligaments, cartilages, etc. are all types of connective tissue present in body with different nature of matrix. Why?

Ans. The nature of matrix of different connective tissues differ according to their specific function, *e.g.*, blood transports nutrients, gases, etc. So, it is a fluid tissue.

Q 21. What are the functions of areolar tissue? *(NCERT INTEXT)*

Ans. Areolar tissue fills the space inside the organs, supports internal organs and helps in repair tissues.

Q 22. Name the following tissues:

(i) Found in the iris of the eye.

(ii) That connects two bones.

Ans. (i) Involuntary muscular tissue

(ii) Ligament.

Q 23. Name the tissue responsible for movement in our body. *(NCERT INTEXT)*

Ans. Muscular tissue

Q 24. What is the specific function of cardiac muscle? *(NCERT EXERCISE)*

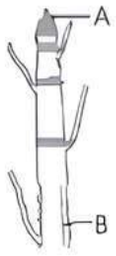
Ans. Cardiac muscles show rhythmic contraction and relaxation throughout life.

Q 25. Name the two types of processes present in neuron.

Ans. Axon and dendrites

Short Answer Type-I Questions

Q 1. (i) In the diagram of meristematic tissue in the plant body given here, identify the type of meristematic tissue found in the regions marked '*A*' and '*B*' of a stem.



(ii) State one function of each.

Ans. (i) A—Apical meristem, B—Lateral meristem.

(ii) Functions:

A—Increases the length of the stem and the root.

B—Increases the girth of the stem or root.

Q 2. Write two differences between meristematic cells and permanent cells.

Ans. Difference between meristematic cells and permanent cells is as follows:

Basis of Difference	Meristematic Cells	Permanent Cells
Division of cells	Cells of meristematic tissue divide repeatedly.	Cells of permanent tissue do not divide and are derived from meristematic tissue.
Cell wall	Cell wall is thin.	Cell wall is either thin or thick.
Vacuoles	Vacuoles are absent.	Large vacuoles are present.
Nature of cells	Living	Living or dead

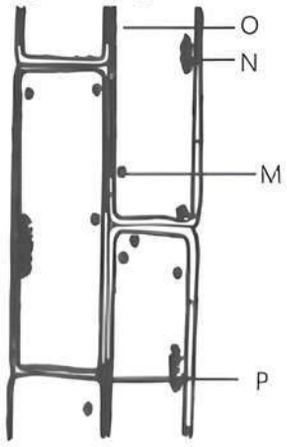
(Any two)

Q 3. How are simple tissues different from complex tissues in plants? *(NCERT EXERCISE)*

Ans. Difference between simple tissue and complex tissue is as follows:

Basis of Difference	Simple Tissue	Complex Tissue
Composition	They are made up of one type of cells.	They are made up of more than one type of cells.
Nature of cells	The cells are similar in structure and function.	The cells are different in structure and function.
Example	Parenchyma, collenchyma and sclerenchyma	Xylem and phloem

Q 4. Given is the diagram showing longitudinal section of parenchymatous tissue. Label the parts *M, N, O* and *P* in the given diagram.



Ans. M—Chloroplast N—Nucleus
O—Cytoplasm P—Intercellular space

Q 5. Write two differences between aerenchyma and chlorenchyma.

Ans. Difference between aerenchyma and chlorenchyma is as follows:

Basis of Difference	Aerenchyma	Chlorenchyma
Definition	Parenchymatous cells having air cavities are called aerenchyma.	Chlorophyll containing parenchymatous cells are called chlorenchyma.
Function	It helps aquatic plants to float.	It helps in photosynthesis.

Q 6. What is the chemical substance that makes the cell walls of sclerenchyma thick? Mention where the tissue is likely to be present.

Ans. Deposition of chemical substance, lignin makes the cell walls of sclerenchyma thick.
Sclerenchyma is found around vascular bundles, in stems, in the veins of leaves, in hard covering of seeds and nuts, husk of coconut, etc.

Q 7. In a temporary mount of leaf epidermis, we observe small pores.
(i) What are the pores present in leaf epidermis called?
(ii) How are these pores beneficial to the plant?

Ans. (i) Stomata are the pores present in leaf epidermis.
(ii) Stomata are the sites of gaseous exchange and transpiration and hence, are beneficial to the plant.

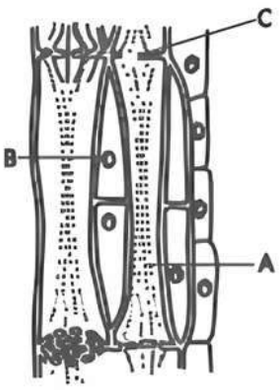
Q 8. How does the cork act as a protective tissue? *(NCERT EXERCISE)*

Ans. Cork acts as a protective tissue in the following ways:
(i) Cork cells are dead and arranged compactly without intercellular spaces.
(ii) Their walls have deposition of a chemical called suberin, which makes them impervious to gases and water.

Q 9. Write the functions of xylem and phloem.

Ans. Xylem is mainly concerned with the transportation of water and minerals. It also provides mechanical support to the plant.
Phloem transports food from leaves to other parts of the plant.

Q 10. Identify the type of plant tissue given in the diagram. Label parts *A*, *B* and *C*.



Ans. Phloem tissue is given in the diagram.
A—Sieve tube cell. B—Companion cell and C—sieve plate.

Q 11. What is epithelial tissue? State the type of epithelial tissue present in cells lining blood vessels?

Ans. The covering or protective tissues in the animal body are epithelial tissues. Epithelial tissue cells are tightly packed and forms a continuous sheet with no intercellular spaces. It play an important role in regulating the exchange of materials between the body and the external environment and also between different parts of the body.
The simple squamous epithelial cells are present in lining of blood vessels.

Q 12. Write two locations of: (i) Simple squamous epithelium (ii) Cuboidal epithelium.

Ans. **(i) Simple Squamous Epithelium:** Oesophagus and lining of the mouth.
(ii) Cuboidal Epithelium: Ducts of salivary gland and lining of kidney tubules.

Q 13. (i) In which connective tissue, matrix contains salts of calcium and phosphorus?
(ii) Which connective tissue is present in ears?
(iii) Which connective tissue connects two bones?
(iv) Which connective tissue is found in bone marrow?

Ans. (i) Bone (ii) Cartilage
(iii) Ligament (iv) Areolar tissue

Q 14. Identify the type of tissue in the following: Skin, bark of tree, bone, lining of kidney tubule, vascular bundle. *(NCERT EXERCISE)*

Ans. **Skin:** Squamous epithelium tissue
Bark of tree: Epidermal tissue (cork)
Bone: Connective tissue
Lining of kidney tubule: Cuboidal epithelium tissue
Vascular bundle: Complex permanent tissue (xylem or phloem).

Q 15. Write the function of bone, cartilage, ligament and tendon.

Ans. **Bone:** It forms supporting framework of body and protects vital organs like brain, heart and lungs.

Cartilage: It smoothens bone surfaces at joints.

Ligament: It connects a bone to bone and is responsible for movement at the joints.

Tendon: It attaches muscles to bones for the movement of various body parts.

Q 16. List any two differences between striated and unstriated muscles.

Ans. Difference between striated and unstriated muscles:

Basis of Difference	Striated Muscles	Unstriated Muscles
Shape	They are long, cylindrical, multinucleate with alternate light and dark bands.	They are spindle shaped, uninucleate and without alternate light and dark bands.
Occurrence	They are mostly attached to bones and help in various movements of body.	These muscles are found in the iris of the eye, in ureters and in the bronchi of the lungs.

Q 17. (i) Voluntary muscles are also known as skeletal muscles. Justify.

(ii) Give two structural characteristics of voluntary muscles.

Ans. (i) Voluntary muscles are also known as skeletal muscles because they are usually attached to bones and take part in their movements as per our conscious will.

(ii) Structural Characteristics:

(a) Presence of alternate light and dark bands.

(b) Multinucleate and unbranched

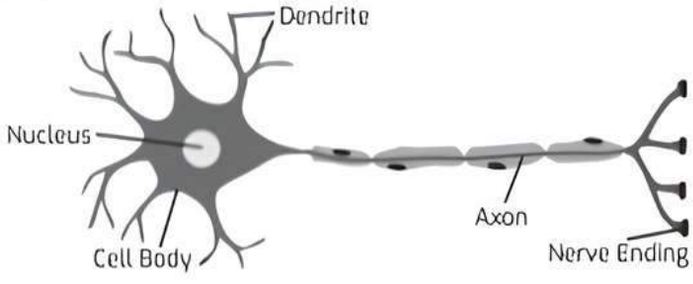
Q 18. How do the cardiac muscles resemble both striated and smooth muscle fibres?

Ans. **Similarity with striated muscles:** Both are cylindrical in shape and have alternate light and dark bands.

Similarity with smooth muscles: Both are uninucleate and involuntary in nature.

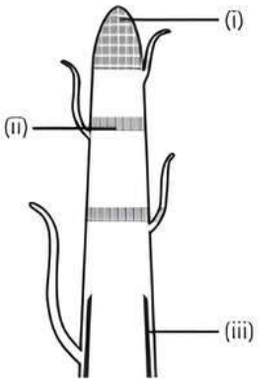
Q 19. Draw a labelled diagram of a neuron.

Ans.



Short Answer Type-II Questions

Q 1. Label the figure and give one function of each part labelled (i), (ii) and (iii).



Ans. **(i) Apical Meristem:** Increase the length of the stem and the root.

(ii) Intercalary Meristem: It helps in increasing the length of the internode and leaves, bending of lodged shoot.

(iii) Lateral Meristem: Increases the girth of the stem and the root.

Q 2. What will happen if:

(i) Apical meristem is damaged or cut?

(ii) Cork is not formed in older stems and roots?

(iii) Cells of epithelial tissue are not compactly packed?

Ans. **(i) Apical Meristem is Damaged or Cut:** If Apical meristem is damaged, then growth in length of the plant will stop.

(ii) Cork is Not Formed: If cork is not formed in older stems and roots, the outer tissues will rupture with the increase in girth and will expose the interior for desiccation and infection.

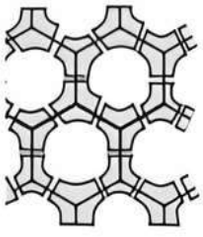
(iii) Cells of Epithelial Tissue not Compactly Packed: Loose packing of epithelial tissue will result in entry of unwanted materials and pathogens into the interior of organs. Desiccation can also occur.

Q 3. Observe the given figure:

(i) Identify the tissue.

(ii) Infer the characteristic features of these cells.

(iii) Specify any two parts of the plant where such cells are present.



Ans. (i) The given tissue is sclerenchyma.

(ii) Characteristic Features:

(a) Thick-walled cells due to lignin.

(b) Cells are dead.

(c) No intercellular spaces.

(iii) Sclerenchyma Cells are Present:

(a) In hard covering of seeds and nuts.

(b) Around the vascular bundles and in the veins of leaves.

Q 4. Write one function of each of the following tissues and also name the chemicals present in them:

(i) Sclerenchyma

(ii) Collenchyma

(iii) Cork cells.

Ans. (i) Function: Providing strength to plant parts. Chemical—Lignin.

(ii) Function: Providing mechanical strength with flexibility. Chemical—Cellulose and pectin.

(iii) Function: Protection of plant bacterial and fungal infection. Chemical—Suberin.

Q 5. Give reasons for the following:

(i) Cells of sclerenchyma tissue have a narrow lumen.

(ii) Branches of a tree move and bend freely in high wind velocity.

(iii) It is difficult to pull out the husk of coconut.

Ans. (i) Sclerenchyma tissues have thick cell wall due to lignin and hence, they have narrow lumen.

(ii) Branches of a tree move and bend freely in high wind velocity because of the presence of collenchyma that provides flexibility.

(iii) Husk of coconut is composed of sclerenchyma, the fibres of which are closely packed. So, it is difficult to pull out the husk of coconut.

Q 6. Why is epidermis important for the plants?

Ans. Epidermis is important for plants due to the following reasons:

(i) It gives protection to the plant.

(ii) It helps in gaseous exchange.

(iii) It checks water loss due to transpiration.

(iv) Epidermal cells of the roots helps in absorption of water and minerals.

(v) It's cell secrete a waxy, water-resistant layer, which protects against loss of water, mechanical injury and invasion by parasitic fungi.

Q 7. Mention three characteristic features and three functions of xylem.

Ans. Characteristic Features of Xylem:

(i) It consists of four types of elements, i.e., tracheids, vessels, xylem parenchyma and xylem fibres.

(ii) Only xylem parenchyma is living. The other three are dead.

(iii) Tracheids and vessels have thick walls and are tubular structures.

Functions of Xylem:

(i) Xylem conducts sap (water and mineral salts) through its tracheary elements.

(ii) It provides mechanical strength to the plant.

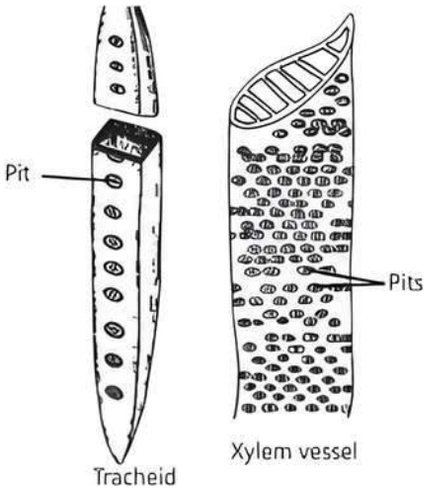
(iii) Xylem parenchyma stores food and helps in sideways conduction of water.

Q 8. (i) State one point of difference between xylem and phloem.

(ii) Draw a neat diagram of xylem vessel and a tracheid.

Ans. (i) Xylem takes part in transportation of water and minerals while phloem helps in the translocation of food materials in the plants.

(ii)



Q 9. Write the location and one function of each:

(i) Cuboidal epithelium

(ii) Glandular epithelium

(iii) Columnar epithelium

Ans. (i) Cuboidal epithelium

(a) Location: Lining of kidney tubules and ducts of salivary glands.

(b) Function: It provides mechanical support.

(ii) Glandular epithelium

(a) Location: Skin (sweat and oil glands), alimentary canal (digestive glands).

(b) Function: Secretion of enzymes and excretion of wastes.

(iii) Columnar epithelium

(a) Location: Lining of stomach and intestine.

(b) Function: Absorption and secretion in intestine.

Q 10. Name the type of epithelial tissue that lines:

(i) Oesophagus

(ii) Respiratory tract

(iii) Kidney tubules

(iv) Inner lining of intestine

(v) Blood vessels

(vi) Ducts of salivary glands

Ans. (i) Simple Squamous epithelium

(ii) Ciliated columnar epithelium

(iii) Cuboidal epithelium

(iv) Columnar epithelium

(v) Simple Squamous epithelium

(vi) Cuboidal epithelium.

Q 11. Give the location and function of the following tissues:

(i) Cartilage (ii) Areolar tissue (iii) Adipose tissue

Ans. (i) Location: Nose, ear, trachea, larynx.

Function: It provides support and elasticity to nose, ear, trachea and larynx. It smoothens the bone surfaces at joints.

(ii) Location: Between the skin and muscles, around blood vessels and nerves as well as in the bone marrow.

Function: It fills the space inside the organs, supports internal organs and helps in repairing of tissues.

(iii) Location: Below the skin and between internal organs.

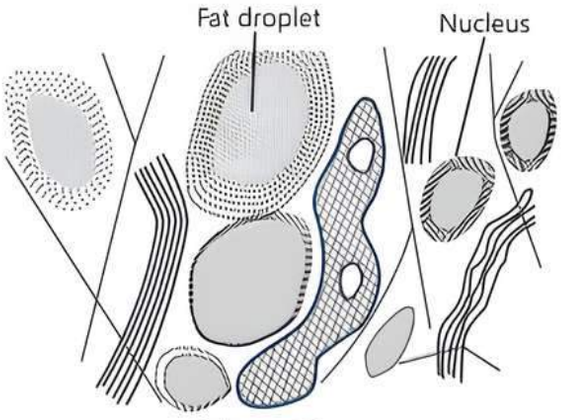
Function: It stores energy in the form of fats and lipids. It cushions and insulates the body and hence, acts as an insulator.

Q 12. (i) Name the tissue that stores fat in our body.

(ii) Describe its structure with diagram.

Ans. (i) Adipose tissue stores fat in our body.

(ii) Structure: It is a connective tissue in which there are large fat storing cells or adipocytes. Matrix is like a jelly. Fibres and cells of connective tissue are also present in it.



Adipose Tissue

Q 13. (i) Name the liquid matrix of blood.

(ii) What does it contain?

(iii) List any two functions of blood.

Ans. (i) Plasma is the liquid matrix of blood.

(ii) It consists of water (92%), salts, proteins and hormones.

(iii) Functions of Blood:

(a) Transport of gases, digested food, hormones and waste materials.

(b) Conducts heat and regulates body temperature.

Q 14. Name the following and give one characteristic of each:

(i) Living tissue that provides mechanical support in plants.

(ii) Highly specialised cells for being stimulated and then transmitting the stimulus very rapidly within the body of animals.

(iii) Animal tissue with multinucleate cells and contractile proteins responsible for movement.

Ans. (i) Collenchyma: Irregular thickened at the corner of the cells.

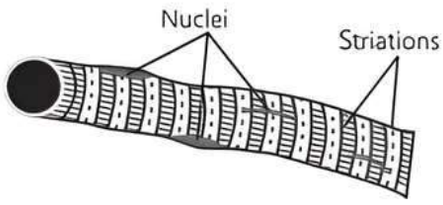
(ii) Neuron: Cell body with branched extensions at one end and long projections at the other end.

(iii) Striated Muscle Fibre: Cells are long, cylindrical unbranched and bear striations in the form of alternate light and dark bands.

Q 15. (i) Draw labelled diagram of striated muscles.

(ii) Mention any two characteristic features of the cells that form the above muscular tissue.

Ans. (i)



(Striated Muscles)

(ii) Characteristic Features:

(a) Presence of light and dark bands.

(b) Cells of this tissue are long, unbranched and multinucleate.

Q 16. (i) Name the single long part which arises from cell body of a neuron.

(ii) What is a nerve impulses? State their function.

(iii) Name two involuntary movements.

Ans. (i) Axon

(ii) The signal that passes along the nerve fibre is called a nerve impulse. They allow us to move our muscles when we want to.

(iii) Involuntary Movements:

(a) Movement of food in the alimentary canal.

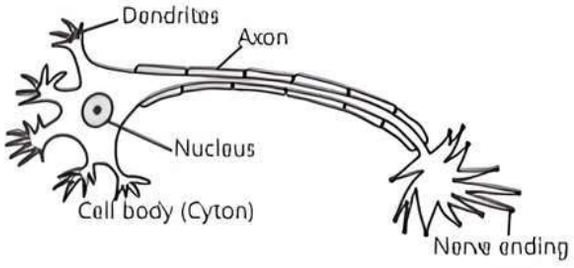
(b) Contraction and relaxation of blood vessels.

Knowledge BOOSTER

Synapse is a region of union of axon of one neuron with the dendrite of next that allows the transfer of nerve impulse.

Q 17. Describe the structure, function and location of the nervous tissue.

Ans. Structure: The nervous tissue is made up of neurons, which consists of a cell body having a nucleus and cytoplasm from which long thin hair-like parts arise.



Function: The nerve cells transmit the stimulus very rapidly from one place to another within the body on stimulation.

Location: These tissues are located in the brain, spinal cord and nerves.

Long Answer Type Questions

Q 1. Differentiate between plant and animal tissues.

Ans. Difference between plant and animal tissues:

Basis of Difference	Plant Tissues	Animal Tissues
Majority of tissues	In plants, dead supportive tissues are more abundant as compared to living tissues.	In multicellular animals, living tissues are more common as compared to dead tissues.

Energy required	They require less maintenance energy as they are autotrophic and can make their own food.	They require more maintenance energy as they are heterotrophic and they have to move in search of food.
Differentiation of tissues	There is a differentiation of tissues into meristematic and permanent tissues, which are localised in certain regions of plant based on their dividing capacity.	Such a differentiation is absent in animals as their growth is uniform.
Growth	Due to the activity of meristematic tissue, plants continue to grow throughout their life.	Animals do not show growth after reaching maturity. Reparative growth is, however, present.
Organisation	Organisation of plant tissues is rather simple.	Organisation of animal tissues is complex with the development of more specialised and localised organs and organ system.
Tissues organisation	Tissues organisation is meant for stationary habit of plants.	Tissues organisation is targeted towards high mobility of animals.

(Any five)

Q 2. (i) Differentiate between meristematic and permanent tissues in plants.
(ii) Define the process of differentiation.
(iii) Name any two simple and two complex permanent tissues in plants.

Ans. (i) Difference between meristematic and permanent tissues:

Basis of Difference	Meristematic Tissues	Permanent Tissues
Cell division	Cells of this tissue divide throughout their life.	They lose the ability to divide to take up specific function.
Location	They are located at specific regions of the plant such as root and stem apex.	They are distributed throughout the plant body.
Shape and structure of cell	Cells of this tissue are very active, have dense cytoplasm, thin walls and prominent nuclei. Vacuoles are absent.	They have vacuoles which vary in shape and size. Their cell wall may be thick.
Cell wall	Cell wall is made up of cellulose.	Cell wall is made up of either cellulose or lignin or suberin.
Nature of cells	Living	Living or dead

(Any five)

(ii) Differentiation can be defined as the loss of ability to divide by taking up a permanent shape, size and function.

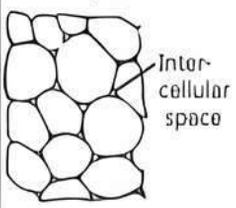
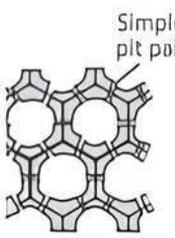
(iii) **(a) Simple Permanent Tissues:** Parenchyma, collenchyma and sclerenchyma. (Any two)
(b) Complex Permanent Tissues: Phloem and xylem.

Q 3. Give reasons for:
(i) Meristematic cells have a prominent nucleus and dense cytoplasm but they lack vacuole.
(ii) Intercellular spaces are absent in sclerenchymatous tissues.
(iii) We get a crunchy and granular feeling when we chew pear fruit.
(iv) Cutting of rose plant is done timely in gardens but still it regains its length.
(v) Bark of a tree is impervious to gases and water.

Ans. (i) Because they need not store food or waste products, so they lack vacuole.
(ii) Because they are lignified, which makes them compact and leaves no intercellular space.
(iii) Due to the presence of sclerenchyma cells.
(iv) Due to the presence of intercalary meristem at the base of leaves or internodes on twigs. The cells of these tissues divide and increase the length of plant.
(v) Due to the presence of a chemical called suberin that makes it impervious to gases and water.

Q 4. Differentiate between sclerenchyma and parenchyma tissues. Draw well labelled diagrams.

Ans. Difference between parenchyma and sclerenchyma:

Basis of Difference	Parenchyma	Sclerenchyma
Cell wall	Cells are thin-walled.	Cells are thick-walled due to lignin.
Type of cell	These are living cells.	Tissues are made up of dead cells.
Intercellular spaces	Cells are usually loosely packed having large intercellular spaces.	No intercellular spaces between the cells are present.
Functions	It stores food.	It provides strength to the plant parts.
Shape and structure of cell	Some cells have chlorophyll called chlorenchyma and perform the process of photosynthesis. Other cells have large air cavities called aerenchyma which provide buoyancy to the hydrophytic plants (plants in water). 	The cells are long and narrow which make the plant hard and stiff. The tissue is present in the stem around vascular bundles, in veins of leaves and hard covering of seeds and nuts. 

Q 5. List the characteristics of cork. How are they formed? Mention their role.

Ans. Characteristics of Cork:

(i) Cells of cork become dead at maturity.

(ii) These cells are arranged compactly.

(iii) Cells do not have intercellular spaces.

(iv) Cells consist of a chemical substance named suberin in their walls.

Formation: As plants grow older, a strip of secondary meristem replaces the epidermis of the stem. Cells cut on the outer side by this meristem to form cork.

Role: They are protective in function for older stem/twigs/branches. They are impervious to gases and water.

Q 6. Why are xylem and phloem called complex tissues? How are they different from one other?

Ans. Both xylem and phloem consist of more than one type of cells, which coordinate to perform a common function. Therefore, xylem and phloem are called complex tissues.

Difference between xylem and phloem:

Basis of Difference	Xylem	Phloem
Components	It consists of tracheids, vessels, xylem parenchyma and xylem fibres.	It consists of sieve cells, sieve tubes, companion cell, phloem parenchyma and phloem fibres.
Function	They transport water and minerals vertically from soil to aerial parts of the plant.	They transport food from leaves to other parts of the plant.
Type of cells	Maximum cells except xylem parenchyma are dead.	Maximum cells except phloem fibres are living.

Q 7. (i) What is stratified squamous epithelium? State its functions.

(ii) What is a ligament? Mention its function.

(iii) What is the specific function of cardiac muscle?

Ans. (i) Epithelial cells arranged in pattern of layers are called stratified squamous epithelium.

Function: It prevents wear and tear.

(ii) Ligament: It is a very elastic connective tissue with very little matrix and binds a bone with another bone.

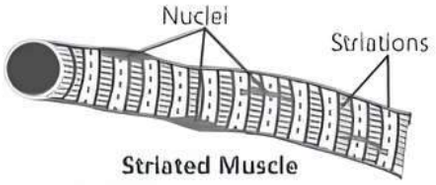
Function: Because of its elasticity, ligament allows bending and rotational movement over a joint.

(iii) The contraction and relaxation throughout the life is the specific function of cardiac muscles.

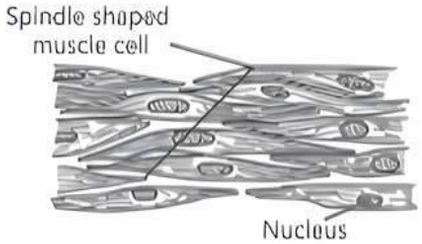
Q 8. Differentiate between striated, unstriated and cardiac muscles on the basis of their structure and site/location in the body along with their diagrams.

Ans. Difference between striated, unstriated and cardiac muscles:

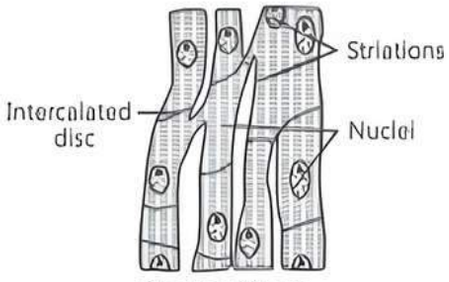
Basis of Difference	Striated Muscles	Unstriated Muscles	Cardiac Muscles
Location	They are found in limbs and are mostly attached to bones.	They are found in iris of eye, in ureters and in bronchi of the lungs.	They are found in the walls of heart.
Shape	Very long, cylindrical and multinucleate.	Long, uninucleate spindle-shaped with pointed ends.	Short, cylindrical and uninucleate.
Structure	Unbranched	Unbranched	Branched
Type of muscle	Voluntary	Involuntary	Involuntary
Striations	They show alternate light and dark bands or striations.	They do not show striations.	They show faint striations.



Striated Muscle



Unstriated Muscle

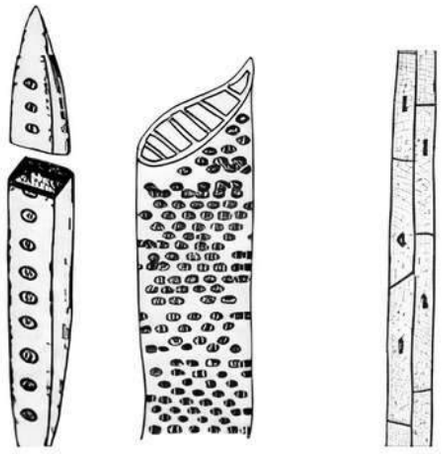


Cardiac Muscle

Chapter Test

Multiple Choice Questions

Q 1. Refer to the given figures (*P*, *Q* and *R*) showing three components of xylem.



Identify the components *P*, *Q* and *R* and select the correct option.

	P	Q	R
a.	Tracheid	Xylem Parenchyma	Vessel
b.	Vessel	Tracheid	Xylem Parenchyma
c.	Tracheid	Vessel	Xylem Parenchyma
d.	Xylem Parenchyma	Vessel	Tracheid

Q 2. Which of these types of cells is most likely to divide?

a. Meristem b. Xylem
c. Parenchyma d. Epidermis

Q 3. Parenchyma cells are:

a. thick walled and specialised
b. relatively unspecified and thin walled
c. lignified
d. None of the above

Q 4. Choose the correctly matched pair.

a. Inner lining of salivary ducts – ciliated epithelium
b. Moist surface of buccal cavity – glandular epithelium
c. Tubular parts of nephrons – cuboidal epithelium
d. Inner surface of bronchioles – squamous epithelium

Assertion and Reason Type Questions

Directions (Q. Nos. 5-6): *Each of the following questions consists of two statements, one is Assertion (A) and the other is Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.*

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

Q 5. Assertion (A): Alimentary canal, iris of the eye and bronchi of lungs, the movements of these organs are not under our will.

Reason (R): These are voluntary muscles.

Q 6. Assertion (A): Muscle fibres are said to be contractile in nature.

Reason (R): Muscle fibres contract and relax to cause movement.

Case Study Based Question

Q 7. The animal cells are grouped together to form animal tissues. The animal tissues are divided into epithelial, connective, muscular and nervous tissues. Epithelial tissues from the protective covering and inner living of the body and organs. The connective tissues are specialised to connect and anchor various body organs. Blood and bone are types of connective tissue. The muscular tissue helps in movement and locomotion. The muscular tissue can be classified as:

Classification	Function
Cardiac	It helps in blood circulation and keeps the heart pumping.
Smooth	These help in peristalsis and other involuntary functions of the body.
Skeletal	It provide support and help in movement.

Nervous tissue makes up the peripheral and the central nervous system. Neuron is the structural and functional unit of nervous system.

Read the given passage carefully and give the answer of the following questions:

(i) What is a tissue?

(ii) Identify the animal tissue from the given description and also mention its location in the human body.
"Tissue has cylindrical branched cells and shows rhythmic contraction and relaxation throughout the life".

(iii) Name the epithelial tissue present in the oesophagus.

(iv) Write one function of fluid connective tissue.

Very Short Answer Type Questions

Q 8. How is the epidermis of the plants living in very dry habitats adapted?

Q 9. What is the function of thin, hair-like projections present on the cuboidal epithelium?

Short Answer Type-I Questions

Q 10. Name the tissue that:

(i) Connects muscle to bone in humans

(ii) Forms inner lining of alveoli

(iii) Stores fat in plants

(iv) Transports water and minerals in plants

Q 11. Write two differences between tendon and ligament.

Q 12. You can easily bend the stem of a plant without breaking it. Name the tissue in the plant which makes it possible. Where is it located? State any two characteristics/features of the cells of this tissue.

Short Answer Type-II Questions

Q 13. What are the various types of animal tissues? Mention briefly the location and one main function of each type of tissues.

Q 14. Differentiate between parenchyma, collenchyma and sclerenchyma.

Q 15. (i) Name the two types of complex tissues.

(ii) Draw a neat diagram of the section of the tissue that is responsible for the translocation of food from the leaves to the different parts of the plant.

Long Answer Type Questions

Q 16. Describe the structure, position and function of different types of epithelial tissues.

Q 17. (i) Draw a diagrammatic labelled sketch of stem tip to show the location of meristematic tissue. Mention the function of each meristematic tissue.

(ii) List the constituents of the xylem. What would happen if the xylem of root of a plant is blocked?