Structural Organisation in Animals

Introduction

- A large variety of organisms, both unicellular and multicellular, of the animal kingdom.
- In unicellular organisms, all functions like digestion, respiration and reproduction are performed by a single cell.
- In the complex body of multicellular animals, the same basic functions are carried out by different groups of cells in a well-organized manner.
- The body of a simple organism like Hydra is made of different types of cells and the number of cells in each type can be in thousands.
- The human body is composed of billions of cells to perform various functions.
- In multicellular animals, a group of similar cells along with similar origin with intercellular substances perform a specific function. Such an organization is called **tissue**.
- You may be surprised to know that all complex animals consist of only four basic types of tissues.
- These tissues are organized in specific proportion and pattern to form an organ like stomach, lung, heart and kidney.
- When two or more organs perform a common function by their physical and/or chemical interaction, they together form organ system, e.g., digestive system, respiratory system, etc. Cells, tissues, organs and organ systems split up the work in a way that exhibits division of labour and contribute to the survival of the body as a whole.

Tissue

- Word animal tissue was coined by – Bichat (Plant tissue by - Grew.)
- Study of tissue – Histology.
- A group of cells in which cells are similar in structure, function and origin is called tissue. **These cells may be dissimilar in structure and function but they are always similar in origin.**

  On the basis of functions & structure tissues are of four types:
  1. **Epithelium/Epithelial Tissue:** Covering and protective tissue
  2. **Connective Tissue:** To connect structures, provide support to the body and transport substances in the body
  3. **Muscular Tissue:** Helps in locomotion and movement.
  4. **Nervous Tissue:** control and co-ordination.

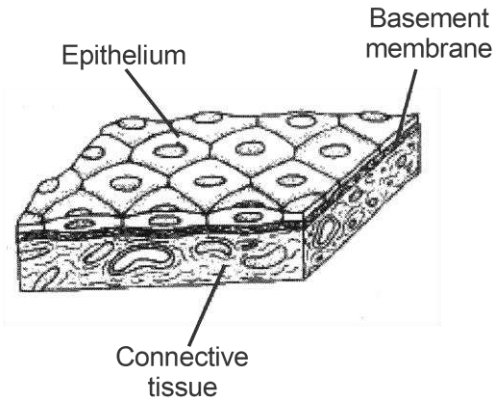
Epithelium Tissue

- Epithelium is the only tissue in which cells are always arranged in uniform layers.
- During embryonic development epithelium originates first.
- Power of regeneration is present in this tissue.
- Word epithelium is composed of two words.

  Epi – Upon

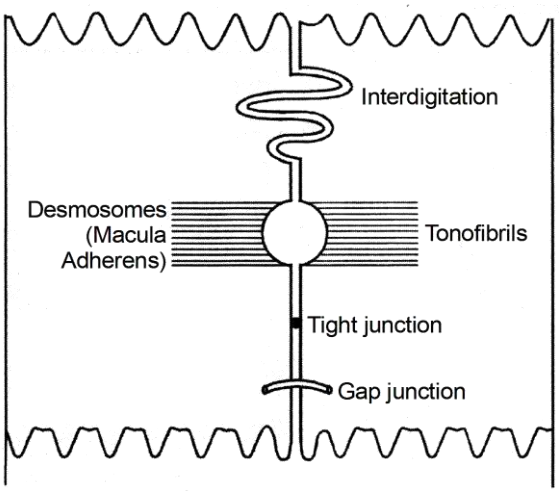
  Thelia – growth
- A tissue which grows upon another tissue is called Epithelium.

- It has a free surface which faces either a body fluid or the outside environment
- Epithelium cells are closely packed with little inter cellular space.
- Due to presence little intercellular space blood vessels, lymph vessels & capillaries are unable to pierce this tissue so blood circulation is absent in epithelium. Hence cells depend for their nutrients on underlaying connective tissue.
- Between epithelium and avascular connective tissue, a thin nonliving acellular basement membrane is present which is highly permeable.



Cell Junctions

- To provide mechanical support for the tissue **plasma membrane of adjacent epithelium cells modified to form following structures (Intercellular Junctions):**
  - **(i) Tight Junction (Zonula Occludens):** At some places Plasma membrane of adjacent cells become fused to form tight Junction. It stops substances from leaking across a tissue.
  - **(ii) Adhering Junction:** Consists of disc - like protein plate with intermediate fibre known as tonofibrils composed of keratin like sclero protein.
    Function : cementing
  - **(iii) Gap Junction:** Facilitate the cells to communicate with each other by connecting cytoplasm of adjoining cells for rapid transfer of ions, small molecules and sometimes big molecules.
    e.g. Smooth muscles and Cardiac muscles.



Origin of Epithelium Tissue:

It is the only tissue which originated from all the three primordial germinal layers.

e.g. (i) Ectoderm – Epidermis (stratified squamous Epithelium)
(ii) Mesoderm – Mesothelium and Endothelium (simple squamous Epithelium)
(iii) Endoderm – Inner lining of GIT (Simple columnar epithelium)

Types of Epithelium Tissue

Simple epithelium
– Composed of single layer of cells
– Functions as lining for body cavities, ducts and tubes.

Compound epithelium
– Consists of 2 or more cell layers.
– It has protective function as it does in our skin

Stratified

Transitional

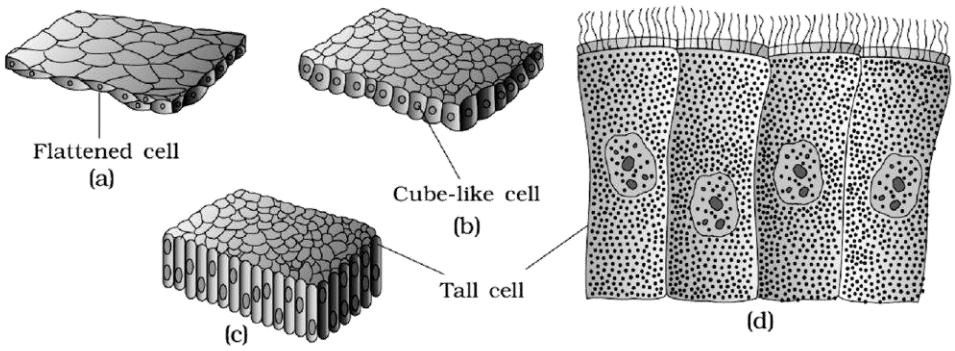
On the basis of shape/ structural modification s of cells

(1) Simple Squamous

(2) Simple Cuboidal

(3) Simple Columnar

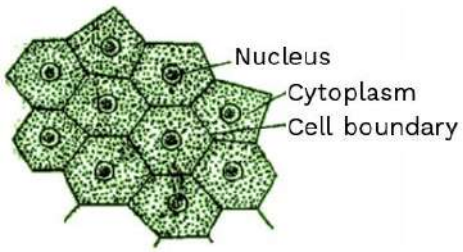
Simple Epithelium:



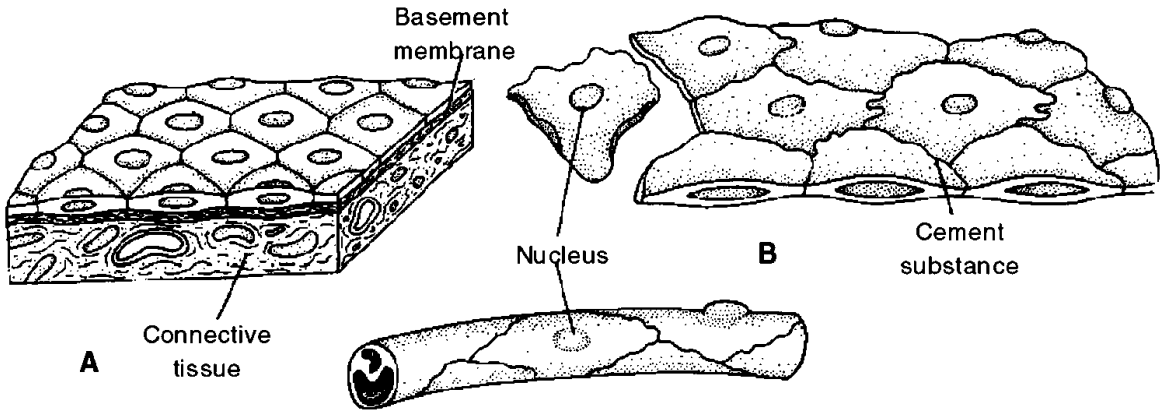
Simple epithelium: (a) Squamous (b) Cuboidal (c) Columnar (d) Columnar cells bearing cilia

(1) Simple Squamous Epithelium:

- Single layered
- Shape of cells are flat or scale like with irregular boundaries.
- Flattened / rounded nucleus is present.
- Cells are more in width and less in length so in vertical section they appear rectangular in shape.
- It is also called **pavement epithelium** (Tile like appearance) and **Tessellated epithelium** (Wavy appearance).
- This epithelium is associated with **filtration & diffusion.**



(Simple squamous epithelium)

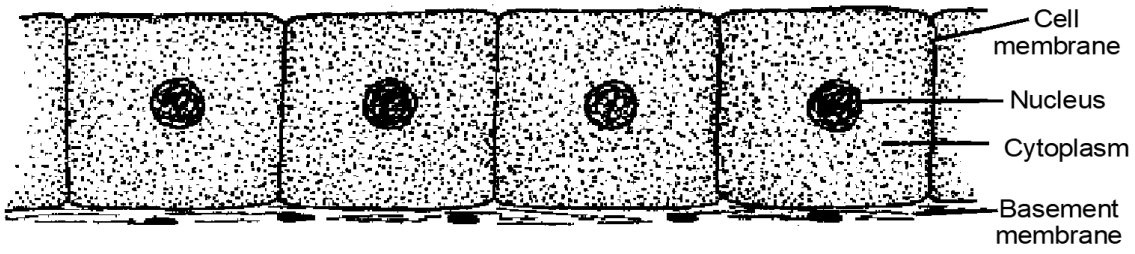


eg.: It is found in the lining of:

- Bowman's capsule (Podocyte) (Inner layer of Bowman's Capsule)
- Thin part of loop of Henle.
- Alveolar - epithelium
- Endocardium – Inner most lining of heart.
- Mesothelium – Covering of coelom is called as mesothelium (Tessellated). (Visceral & Parietal peritoneum, Visceral and parietal pleura, Visceral and Parietal pericardium).
- Endothelium – Inner lining of blood vessels, lymph vessels and heart wall (Tessellated).

(2) Simple Cuboidal Epithelium:

- Shape of cells are cube like.
- A rounded nucleus is present in the center of cell.



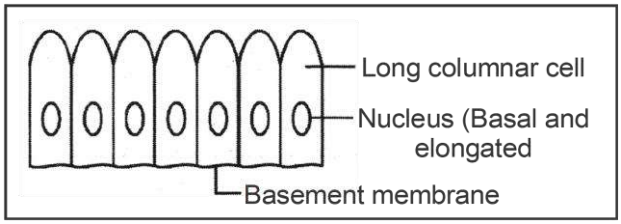
- This epithelium helps in **absorption, secretion & excretion.**

  e.g.

  - Choroid
  - Ciliary body of eye
  - Nephron or renal tubule (PCT & DCT)
  - This epithelium is also called **Germinal epithelium** because in gonads (testis & ovaries) cuboidal cells divide to form egg & sperm.

(3) Simple Columnar Epithelium:

- Cells are pillar like in shape. (Tall & Slender)
- Elongted nucleus is present at the base of cell.
- Cells are more in length and less in width so they appear pillar shaped in vertical section.
- It helps in absorption and secretion.



e.g. Bile Duct, Liver

Note- Ciliated epithelium:

If the columnar or cubidal cells bear cilia on their free surface they are called **ciliated epithelium.**

Their function is to move particles or mucus in a specific direction over the epithelium.

e.g. Fallopian tubes, Bronchioles

Concept Builder

1. Which is incorrect with reference to Epithelium tissue?
(1) It has free surface which faces either a body fluid or the outside environment
(2) It has compact arrangement of cells
(3) It has minimum regeneration ability
(4) It has little intercellular matrix

2. Which of the following have same type of tissue?
(1) Duct of Glands, air sac of lungs (2) Intestine, wall of blood vessels
(3) Tubular part of Nephron, Duct of glands (4) Wall of blood vessels, stomach

3. Which tissue is located in Fallopian tube and proximal convoluted tubule of kidney respectively
(1) Squamous epithelium, Columnar epithelium
(2) Cuboidal epithelium, Ciliated columnar epithelium
(3) Ciliated Cuboidal epithelium, Cuboidal epithelium
(4) Ciliated columnar epithelium, Cuboidal epithelium

4. All are composed of simple squamous epithelial tissue except:
(1) Endothelium (2) Ependymal Epithelium
(3) Endocardium (4) Mesothelium

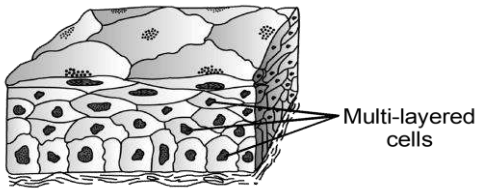
5. Ciliated Epithelium is not found in: -
(1) Ventricles of Brain (2) Ventricles of Heart
(3) Fallopian tube (4) Trachea

6. Identify incorrect match from followings according to structure and its tissue:
(1) Nephron – Cuboidal Epithelium
(2) Lining of Coelom – Squamous Epithelium
(3) Intestine – Ciliated columnar Epithelium
(4) Epididymis – Stereo ciliated columnar Epithelium

Concept Builder (Answer-Key)						
Que.	**1**	**2**	**3**	**4**	**5**	**6**
Ans.	3	3	4	2	2	3

Compound Epithelium

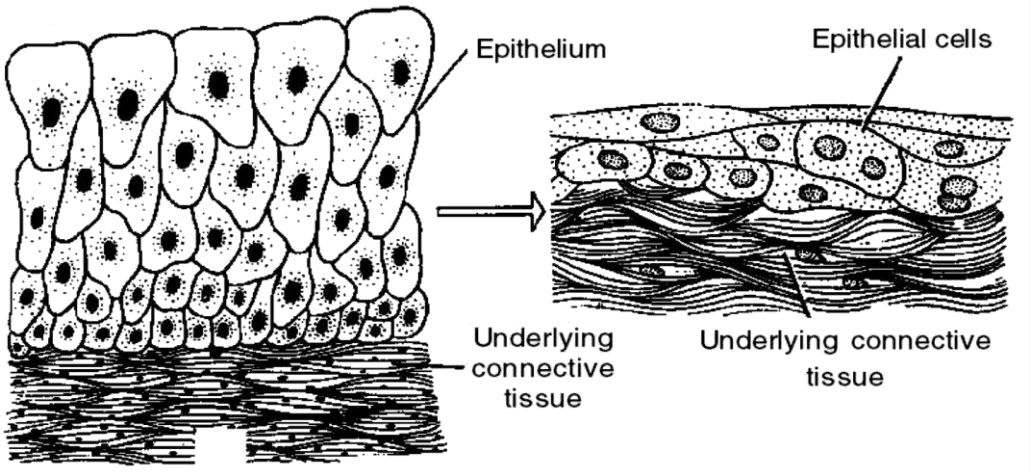
- Multilayered.
- Limited role in secretion and absorption. It provides protection against chemical and mechanical stresses.
  On the basis of stretching ability it is of 2 types –



Compound epithelium

(1) Transitional Epithelium : Stretchable.

e.g. – Renal Pelvis
– Ureter
– Urinary Bladder
– Proximal part of male urethra.



(2) Stratified Epithelium :

- Non-Stretchable
- Cells of outermost layer are scale like flat cells.
- On the basis of presence of keratin protein in the outer most cells this epithelium is of two types.

i. Keratinized Stratified Squamous Epithelium.

If keratin protein is present in scaly cells and cells become non-nucleated dead cells.

e.g. – Dry surface of skin (Epidermis of skin)

ii. Non Keratinized Stratified Squamous Epithelium.

If Keratin protein is absent. Cells are nucleated and Living.

e.g. – Moist surface of buccal cavity
– Pharynx
– Oesophagus
– Anal canal
– Lining of vagina
– Cornea of eye
– Conjunctiva of eye
– Ducts of pancreas and salivary - glands.

Glands

- A cell or a group of cells which secretes chemical substances are called glands.
- All glands are composed of Epithelium tissue. Such epithelium is called glandular epithelium
- Glands can originate from all the three germinal layers.

Classification of Glands:

(i) On the basis of presence of secretory duct glands are of 3 types:

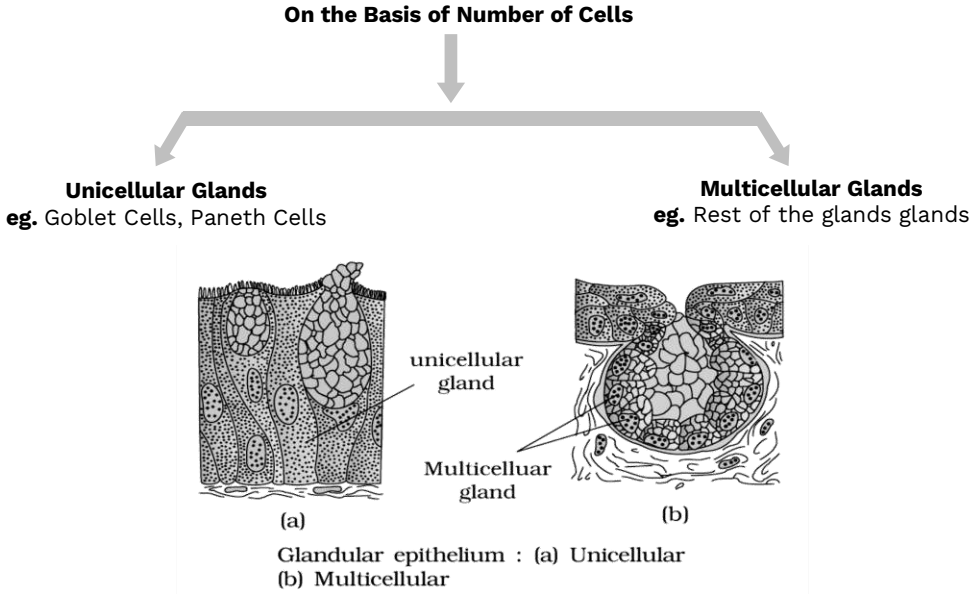
(a) Endocrine Glands: Secretory duct absent – pituitary, adrenal etc.

(b) Exocrine Gland: Secretory duct present – Liver (largest gland), tear gland, oil gland, sweat gland, milk gland.

(c) Heterocrine/Mixed Gland:- Both endocrine & exocrine parts are present.

e.g. Pancreas, Gonads etc.

(ii) On the basis of Number of cells-



Glandular epithelium : (a) Unicellular (b) Multicellular

Concept Builder

1. Stratified squamous epithelium tissues is present in: -
(1) End of bones and Trachea (2) Lungs and kidneys
(3) Urinary bladder and kidneys (4) Mouth and Oesophagus

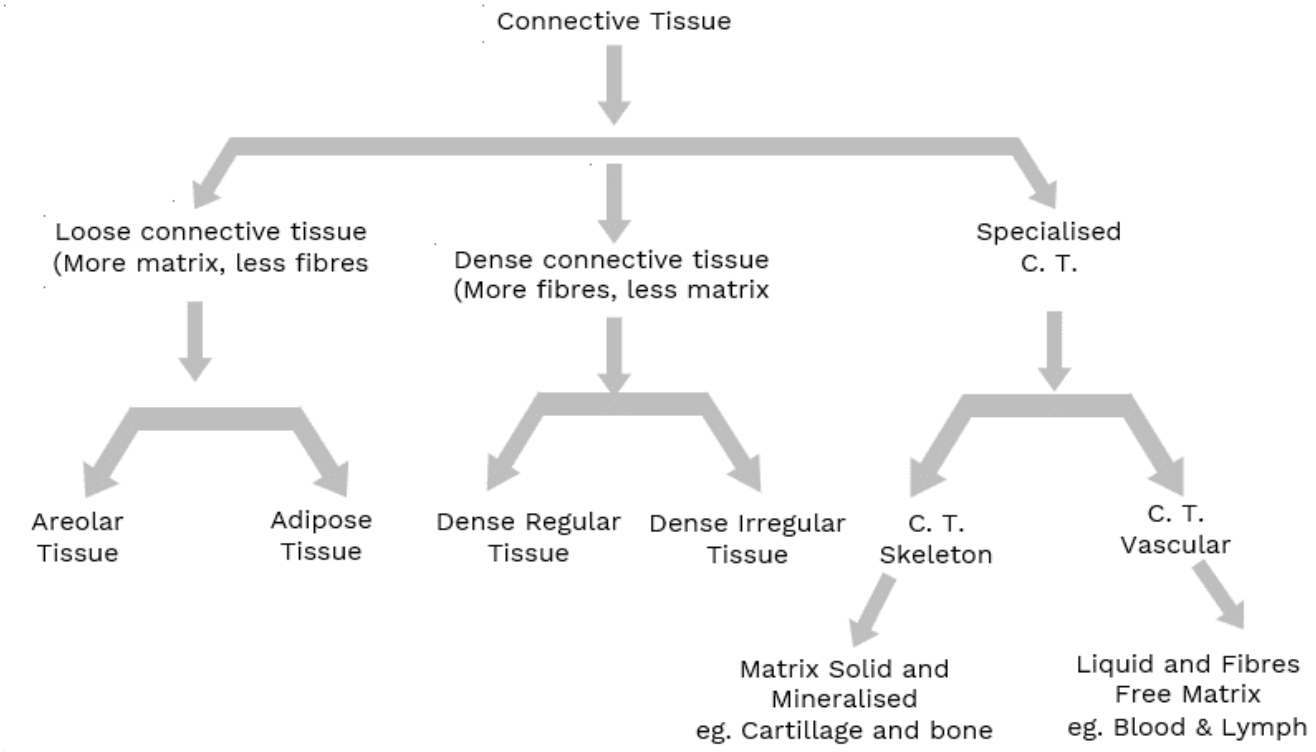
2. The presence of Keratin provides a tough protective characteristic to ___:
(1) Stratified cuboidal epithelium (2) Stratified columnar epithelium
(3) Stratified Squamous epithelium (4) Transitional Epithelium

3. Compound epithelium is not found in: -
(1) Moist surface of buccal cavity (2) Pharynx
(3) Inner lining of Intestine (4) lining of oesophagus

Concept Builder (Answer-Key)			
Que.	**1**	**2**	**3**
Ans.	4	3	3

Connective Tissue

- Connective tissues are most abundant and widely distributed in the body of complex animals. They are named connective tissues because of their special function of linking and supporting other tissues/organs of the body.
- They range from soft connective tissues to specialized types, which include cartilage, bone, adipose, and blood. In all connective tissues except blood, the cells secrete fibres of structural proteins called collagen or elastin.
- The fibres provide strength, elasticity and flexibility to the tissue. These cells also secrete modified polysaccharides (mucopolysaccharides), which accumulate between cells and fibres and act as matrix (ground substance).
- On the basis of matrix connective tissue is of 3 types:
  1. Connective Tissue Proper (loose C.T.+ Dense C.T.): Matrix soft and fibrous
  2. Connective Tissue Skeleton: Dense and mineralized matrix. Due to deposition of minerals it becomes hard.
  3. Connective tissue Vascular: Liquid and fibres free matrix.



Connective Tissue Proper

Connective Tissue Proper is composed of three components

(A) Different types of cells.

(B) Fibres.

(C) Matrix.

(A) Cells of Connective Tissue Proper :

1. **Fibroblast Cells:**
   - Largest cell and maximum in number of connective tissue proper.
   - Cytoplasm of fibroblast is rich in rough ER.
   - Fibroblast cells are also considered as undifferentiated cells of connective tissue because they can be modified into **Osteoblast** & **Chondroblast** cells to produce bone & cartilage.
     Function: (1) To produce fibres (2) To secrete matrix

2. **Plasma Cell: - Cart Wheel Cell**
   - In these cells rounded nucleus is present in which chromatin material is arranged like spokes (radial rows) in wheel so they are also called as **Cart wheel cells**.
   - According to scientists these cells are formed by the division of lymphocytes. So they are also called as **clone of lymphocytes**.
     Function: To produce, Secrete & transport of antibody.

3. **Mast Cells (Mastocytes):**
   - These are like basophils of blood in structure and function.
   - In these cells 's' shaped nucleus is present which is divided into 2 or 3 lobes and lobes are interconnected by protoplasmic strands.

   Functions:
   (a) Histamine
   (b) Serotonin (5–hydroxy tryptamine)
   (c) Heparin

4. **Adipose Cells:**
   - Oval shaped cells which stores fat.

5. **Macrophages (Histeocytes):**
   - It is 2nd largest in size & 2nd maximum in number.
   - Amoeboid in shape with bean or kidney shaped nucleus.
   - They are **phagocytic** in nature. They destroy bacteria & viruses by phagocytosis. They arise by the fusion of monocytes.
   - Also called as **scavenger cells** of connective tissue because they destroy dead or damaged cells to clean connective tissue.

   Macrophages of:

Lung	—	Dust cells or alveolar macrophage
Liver	—	Kupffer cells
Blood	—	Monocytes
Brain	—	Microglial cells
Thymus gland	—	Hessel's granules
Spleen	—	Reticulo-endothelial cells

(B) Fibres:

I. Collagen Fibres (White Fibres) :

1. They are bright & white fibres composed of collagen protein.
2. It is present in maximum quantity in vertebrates and only collagen fibres constitutes one third part of connective tissue fibres.

II. Elastic Fibres — (Yellow Fibres)

1. They are yellow in colour and composed of elastin protein.

III. Reticular Fibres : reticulin protein

1. They are yellow in colour and composed of elastin protein.

(C) Matrix (Ground Substance):

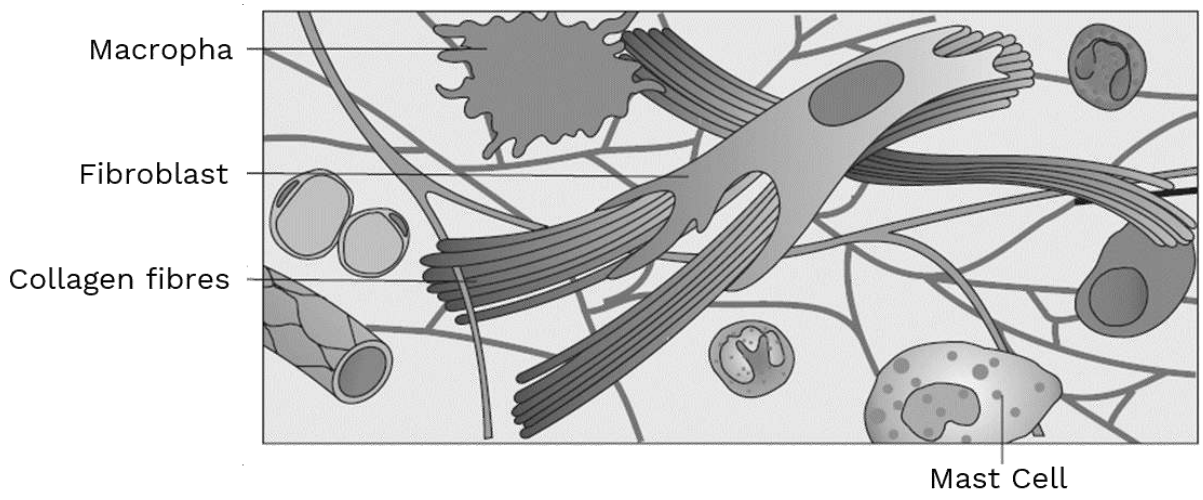
– Matrix is composed of mucopolysaccharide which is present in the form of hyaluronic acid.

Types of Connective Tissue Proper :

1. Areolar Connective Tissue/Spongy Connective Tissue :

- It is most widely distributed tissue in the body.
- Often it serves as a support framework for epithelium.
- In this tissue maximum intercellular space or substances/matrix is present.
- Due to irregular arrangement of bundle of collagen fibres many gaps are present. These spaces are called Areolae.
- In cells mast cells, macrophage & fibroblast are more in number.

  e.g. - Beneath the skin.
  – Endomysium
  – Perimysium
  – Endoneurium
  – Sub mucosa of Trachea, Bronchi, Alimentary canal

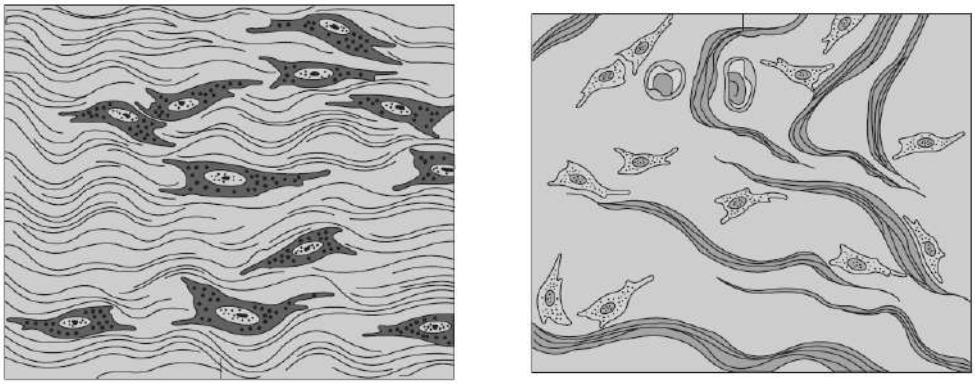


Areolar tissue

2. Adipose Connective Tissue :

- It is a modification of areolar connective tissue. But in areolae major component is adipocytes which store fats.
- The excess of nutrients which are not used immediately are converted into fats and stored in this tissue.
- Beneath the skin
- On the basis of adipocytes 2 type of fats are found in animals.
  1. White fat
  2. Brown fat (Stores more energy)

Dense/Fibrous Connective Tissue :



(a) Dense regular connective tissue (b) Dense irregular connective tissue

1. White Fibrous Connective Tissue :

In this tissue bundle of collagen fibres are more in quantity & other components of connective tissue proper are less in quantity.

Yellow fibres & reticular fibres are completely absent.

In cells fibroblast and mast cells are more in number.

On the basis of arrangement of fibres & matrix this tissue occurs in two forms.

(A) Dense Regular :

1. Bundle of collagen fibres & matrix are distributed in regular pattern (alternate pattern).
2. Fibroblast cells are arranged in a series. Mast cells are scattered in matrix.

   e.g. Tendon: A structure which connects muscles & bones.

(B) Dense Irregular :

In this form there is no regular pattern of fibres & matrix.

e.g. – Dermis of skin
– Pericardium
– Periosteum
– Perichondrium
– Epimysium
– Duramater
– Glisson's capsule
– Renal capsule
– Splenic capsule

2. Yellow Fibrous Connective Tissue (YFCT) :

- In this tissue yellow fibres are more in quantity but collagen fibres are also present.
- Reticular fibres are absent.
- On the basis of distribution of fibres & matrix they are of two types.

(A) Dense Regular :

In this form bundle of collagen fibres & matrix distributed in a regular pattern & in matrix yellow fibres form network.

e.g. Ligaments — A structure which connects bones.

(B) Dense Irregular :

Irregular distribution of fibres and matrix with elastic fibre.

e.g. – In the skin.

Concept Builder

1. Connective tissue in which cells and fibres loosely arrange in a semi fluid ground substance:

(1) Areolar Connective tissue (2) WFCT

(3) Adipose Connective tissue (4) Both (1) and (3)

2. Which is not the function of Fibroblast cells?

(1) Synthesize Matrix (2) Production of fibres

(3) Secretion of anticoagulant (4) None of the above

3. Identify incorrect match from following?

(1) Plasma cell – Secretes antibody

(2) Mast cell – Clone of Lymphocyte

(3) Adipose cell – Stores Fat

(4) Macrophage – Phagocytic nature

4. All features are of loose connective tissue except: -

(1) Contains semi fluid ground substance

(2) Fibres and fibroblast cells are arranged compactly

(3) having more matrix less fibre

(4) Contains fibroblast cell, macrophage and mast cells in matrix.

Concept Builder (Answer-Key)					
Que.	1	2	3	4	
Ans.	4	3	2	2	

Specialized Connective Tissue

- Matrix is dense & mineralized. Due to deposition of minerals it becomes hard.
- Also known as **Skeletal/Supporting Tissue** i.e. Provide support to body framework.
- It is of 2 types
  1. Cartilage
  2. Bone

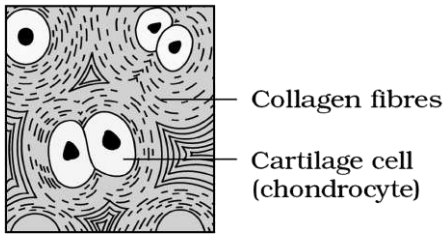
Cartilage :

- Outer most covering of cartilage is called **Perichondrium** which is composed of white fibres connective tissue.
- **Matrix is solid, pliable and resists compression**
- Cartilage producing cells are arranged on periphery of cartilage known as **Chondroblast.**
- These are active cell & divide to form chondrocytes, and synthesize the matrix of cartilage.
- Mature cells of cartilage are called **Chondrocytes.**
- They are found in vacuole like space in matrix called Lacuna. In which 1 - 4 Chondrocytes are present.
- **Chondroclast** are cartilage destroying cells.
- Matrix of cartilage is called **chondrin.**
- Matrix of cartilage provides rigidity & elasticity to cartilage.
- **Blood circulation is absent** in the matrix of cartilage but blood supply present in perichondrium.

Type of Cartilage :

There are following types of cartilage

1. Hyaline cartilage
2. Fibrous cartilage
   (a) Elastic cartilage
   (b) White fibrous cartilage
3. Calcified cartilage.



Cartilage

1. Hyaline Cartilage :

e.g. – Nasal septum.
- 'C' shaped rings of trachea and bronchi.
- Sternal part of ribs (Coastal cartilage).
- Laryngeal cartilage: Thyroid, Cricoid, Arytenoid (Maximum part of larynx).
- Articular cartilage (At the end of long bone periosteum is absent and hyaline cartilage is present which is known as articular cartilage).

2. **Fibrous Cartilage :**
   e.g. – Tip of Nose
   – Ear Pinna (Outer ear)
   – Epiglottis
   – Cartilage of Santorini
   – Wall of eustachian tube
   – Pubic symphysis (Connects both the pelvic halves with each other).
   – Intervertebral disc. present between adjacent bones of vertebral column.
3. **Calcified Cartilage :**
   e.g. – Head of femur and humerus in human.

Bone

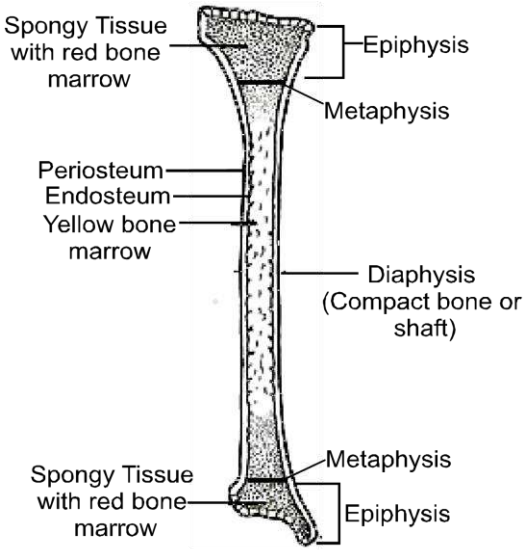
- Study of bone – osteology
- Process of bone formation – Ossification
- Hardest Tissue – Bones
- Softest Tissue – Blood.
- Hardest substance – Enamel. (It is not a group of cells but it is formed by the secretion of ameloblast cells of teeth.)
- Outermost covering of bone is Periosteum composed of white fibrous connective tissue.
- Bone producing cell is called Osteoblast. They divide to form Osteocyte & synthesize organic part of matrix.
- Mature cell of bone is called as osteocyte which is found in lacuna. Only one osteocyte is found in lacuna.
- Bone destroying cells are Osteoclast cells.

Matrix :

- Bone have hard and non-pliable ground substance rich in calcium salts and collagen fibre which give bone its
- strength.
- It has two parts
  Inorganic Part : 65 - 68%
  $Ca_3(PO_4)_2$ – 80% max.

  Organic Part (Ossein) : 32 - 35%

Structure of Developing Long Bone :



L. S. of developing long Bone.

Long Bone has Three Regions :

(1) Epiphysis
(2) Diaphysis
(3) Metaphysis

(1) Epiphysis :

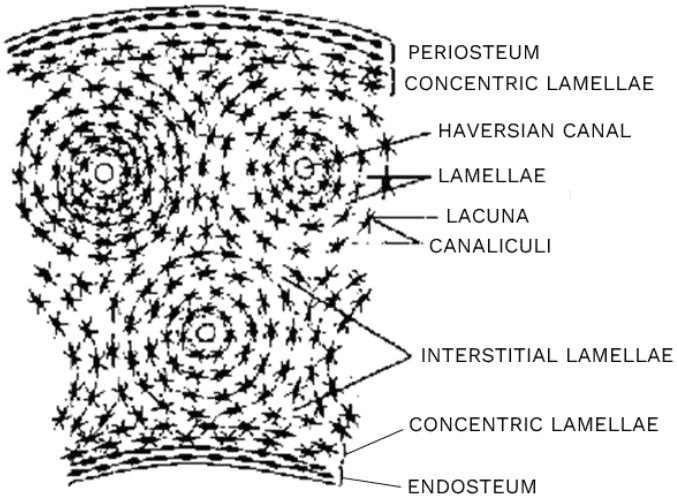
- Ends of long bone is called **Epiphysis**. This part is composed of spongy tissue. If this part is present at the joint then on articular surface **periosteum** is absent & articular cartilage (Hyaline cartilage) is present.
- cavity is present in the form of **trabeculae** filled with red bone marrow.
- It is composed of myeloid tissue which produce blood corpuscles so epiphysis act as a haemopoietic organ.

(2) Diaphysis :

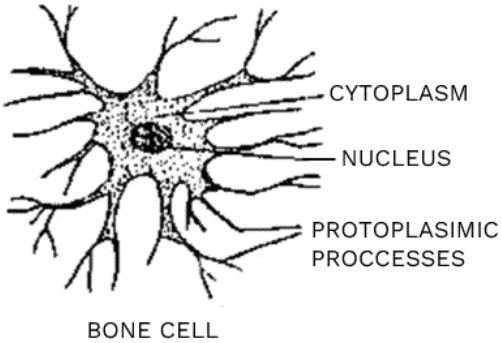
(3) Metaphysis :

- It formed little part between epiphysis & Diaphysis.
- In this region **epiphyseal plate** is present which is made up of osteoblast cells. They divide to form osteocyte and also synthesize matrix of bone, so epiphysial plate is responsible for elongation of bone.
- After complete development of long bone this plate is destroyed.
- In completely developed bone only **2 regions (Epiphysis and Diaphysis)** are found while in a developing bone **3 regions (Epiphysis, Diaphysis and Metaphysis)** are present.

Internal Structure of Mammalian Bone :



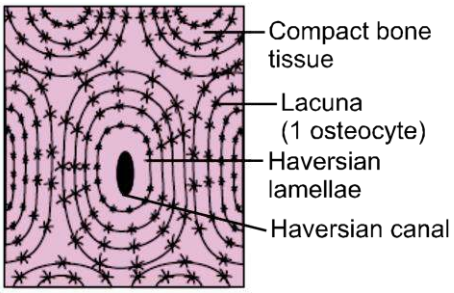
(T.S. of Mammalian long bone)



BONE CELL

It has following major structures :

1. Periosteum
2. Matrix
3. Endosteum
4. Bone marrow cavity



1. Periosteum :

- Outermost covering of bone is called **Periosteum.**
- It consists of two layers.
- Outer layer consist of WFCT in which blood circulation is present.
- Inner layer - consists of single layer of osteoblast cells. These cells are cube like in shape in which oval shaped nucleus & basophilic granules are present in cytoplasm.
- They divide to form osteocyte and secrete layers of matrix.

2. **Matrix :**
    - It is composed of inorganic & organic compounds.
    - In the matrix of bone two types of canals are present.
        1. **Haversian canal**
        2. **Volkmann's canal**
    - **Haversian Canal :** Longitudinal canals which are arranged parallel to long axis of bone. In these canals one or two blood capillaries and nerve fibres are present.

3. **Bone Marrow Cavity :**
    - In the central region hollow cavity is present which is filled with YBM. it is composed of white fat & its function is collection of fats or storage of fats.

Importance of Bones:

- Provide structural frame to the body.
- Provide support and protection to softer tissues and organs.
- Such as long bones of the legs serve weight bearing functions.
- Interact with skeletal muscle attached to them to bring about movements.
- Bone marrow in some Bones is the site of production of blood cells.

Types of Human Bones :

On the basis of development or location of ossification bones are of four types.

1. **Cartilaginous Bones/Replacing/Endochondral Bone :**
    - These bones are developed from cartilage or they are formed by the ossification of cartilage.
    - These bones are also called as replacing bones.

    e.g.: Maximum bones of our body like limb bones (Fore & Hind), Ribs.
2. **Membranous Bones/Dermal Bones/Investing Bones :**
    - These bones are developed from the connective tissue of dermis or formed by ossification in the connective tissue of dermis.

    e.g.:**Pubis, Sternum, Nasal Bone, Clavicle, Vomer Bone (Present in the posterior part of Nasal chamber) Scapula bone.**
3. **Sesamoid Bones :**

    These bones are developed by the ossification of tendons at the joints.

    e.g.:Pisciform (wrist bone) of man. (One out of 8 carpals in man)

    patella (knee bone) Largest sesamoid bone.

Concept Builder

1. Which statement is not true w.r.t matrix of Cartilage?

(1) Contains Lacuna in which 1– 4 chondrocytes

(2) Solid and non-pliable

(3) Resists compression ability

(4) Blood circulation is absent

2. Cartilage is not found in: -

(1) Tip of nose

(2) Limbs and Hand in Adults

(3) Dermis of skin

(4) Outer ear

3. Which structure facilitates blood circulation in Bone mainly?

(1) Osteocyte

(2) Haversian canal

(3) Longitudinal canal

(4) Both (2) and (3)

4. Identify incorrect pair from following: -

(1) Trabeculae –Channels filled with RBM

(2) Lacuna – Small cavities in Matrix

(3) Osteon – present in spongy Bone

(4) Endosteum – Covering of bone marrow cavity

5. In bone, region responsible for elongation is:

(1) Epiphysis and Metaphysis

(2) Metaphysis only

(3) Diaphysis and Metaphysis

(4) Diaphysis only

Concept Builder (Answer-Key)					
Que.	1	2	3	4	5
Ans.	2	3	4	3	2

Exercise - I

1. Pseudostratified epithelium is present in:
(1) Nephron & Neuron
(2) Larynx & Pharynx
(3) Trachea & Bronchi
(4) Urinary Bladder & Intestine

2. Transitional Epithelium is found in:
(1) Renal pelvis & Ureter
(2) Urinary bladder
(3) Proximal part of male urethra
(4) All of above

3. Columnar Epithelium with microvilli or Brush Border is present in:
(1) Gall Bladder (2) Stomach
(3) Appendix (4) Pharynx

4. Stratified squamous epithelium found in:
(1) Buccal cavity (2) Stomach
(3) Intestine (4) Spleen

5. The internal lining of blood vessels is called as:
(1) Mesothelium
(2) Endothelium
(3) Cuboidal Epithelium
(4) Stratified Epithelium

6. Which of the following tissue covers moist surface of buccal cavity and pharynx?
(1) Cuboidal epithelium
(2) Columnar epithelium
(3) Transitional epithelium
(4) Stratified epithelium

7. Non-keratinised stratified squamous epithelium is found in:
(1) Skin (2) Stomach
(3) Oesophagus (4) Intestine

8. Epithelial lining of cornea is composed of:
(1) Stratified squamous nonkeratinized
(2) Transitional
(3) Simple cuboidal
(4) Simple squamous

9. Epithelial tissue originated from:
(1) Ectoderm (2) Endoderm
(3) Mesoderm (4) All of above

10. Inner lining of gut, stomach & liver is made up of:
(1) Simple squamous
(2) Simple cuboidal
(3) Simple columnar
(4) Pseudo stratified epithelium

11. Epithelial tissue with thin flat cells appearing like packed tiles occurs on:
(1) Inner lining of intestine
(2) Inner lining of stomach
(3) Inner lining of fallopian tubes
(4) Outer surface of Intestine

12. Compound squamous epithelium occurs in:
(1) Stomach
(2) Moist surface of buccal cavity
(3) Intestine
(4) Trachea

13. Find out the incorrect match:

A	Ciliated epithelium	Bronchioles and Fallopian tubes
B	Compound epithelium	Ducts of salivary glands
C	Dense regular connective tissue	Tendons and ligments
D	Areloar connective tissue	Present in the skin

(1) A & C (2) B & C
(3) A & D (4) Only D

14. Germinal Epithelium of ovary is formed of:
(1) Columnar Epithelium
(2) Squamous Epithelium
(3) Cuboidal Epithelium
(4) Stratified Epithelium

15. Epidermis of skin of vertebrates comprises:
(1) Simple Epithelium
(2) Stratified Epithelium
(3) Transitional Epithelium
(4) Columnar Epithelium

16. Inner lining of blood vessels and heart is tessellated epithelium which is:
(1) Simple squamous due to wavy appearance
(2) Simple squamous due to tile like appearance
(3) Simple cuboidal due to wavy appearance
(4) Simple columnar Epithelium

17. Stretchable & Water proof Epithelium:
(1) Simple cuboidal
(2) Simple squamous
(3) Simple Columnar
(4) Transitional

18. Mesothelium is:
(1) Lining of coelom which originated from mesoderm
(2) Lining of coelom which originated from ectoderm
(3) Lining of heart which originated from Endoderm
(4) Lining of heart which originated from Mesoderm

19. Lining of brain ventricle & central canal of spinal cord is called as:
(1) Ependyma (2) Endothelium
(3) Mesothelium (4) Neurosensory

20. This epithelium is made up of a single thin layer of flattened cells and is involved in diffusion, it is found in:
(1) Walls of blood vessels
(2) Ducts of glands
(3) Tubular parts of nephrons
(4) All of these

21. Stereocilia present in:
(1) Epididymis (2) Seminal vesicle
(3) Ureter (4) Kidney

22. Mucous cells (Goblet cells):
(1) Unicellular gland
(2) Multicellular glands
(3) Endocrine glands
(4) Parietal cells of gastric glands

23. Lining of blood vessel and air sacs of lungs are made up of:
(1) Pavement Epithelium
(2) Columnar Epithelium
(3) Cuboidal Epithelium
(4) Pseudo stratified Epithelium

24. Lining of uterus (endometrium) is:
(1) Stratified squamous
(2) Simple columnar
(3) Ciliated columnar
(4) Ciliated stratified columnar epithelium

25. Gap junctions:
(1) Help to stop substances from leaking across a tissue
(2) Perform cementing to keep neighbouring cells together
(3) Provide stretch ability to the epithelium
(4) Facilitate the cells to communicate with each other by connecting the cytoplasm of adjoining cells

26. Ciliated Epithelium found in:
(1) Oviduct (2) Trachea
(3) Bronchi (4) All of above

27. Brush border Epithelium (Microvilli containing) found in:
(1) PCT
(2) Loop of Henle
(3) Collecting duct
(4) Bowman's capsule

28. Tessellated epithelium is present in:
(1) Ependymal membrane
(2) Endothelium
(3) Schneiderian membrane
(4) Alveoli of lungs

29. Glands of vertebrates are originated from:
(1) Ectodermal (2) Endodermal
(3) Mesodermal (4) All the above

30. Select the false statement with respect to epithelial tissue:
(1) It has a free surface
(2) It faces body fluids sometimes
(3) It faces the external environment sometimes
(4) It sometimes forms middle structure part of organs

31. The correct statement with respect to epithelial tissue is:
A – cells are compactly packed
B – cells have little intercellular space
C – cells have little intercellular substance
D – it is single or multi-layered
(1) A & D (2) B & C
(3) A, C & D (4) All of these

32. Wall of Bowman's capsule in nephron is made up of:
(1) Cuboidal epithelium
(2) Columnar epithelium
(3) Squamous epithelium
(4) Glandular epithelium

33. Vesicles or acini of thyroid gland is composed of:
(1) Simple squamous epi.
(2) Simple cuboidal epi.
(3) St. squamous epi
(4) St. cuboidal epi.

34. Stratified epithelial tissue is:
(1) Protective covering
(2) Reproductive structure
(3) Nerve cells
(4) Corpuscles.

35. Stratified and nonkeratinized squamous epithelium occurs in:
(1) Epidermis of skin (2) Vagina
(3) Buccal cavity (4) Both (2) and (3)

36. Basement membrane is formed of:
(1) Epidermal cells
(2) Endodermal cells
(3) Both (1) and (2)
(4) None of the above but present below epithelial cells

37. Brush border epithelium occurs in:
(1) Trachea (2) Stomach
(3) Small intestine (4) Fallopian tube.

38. Longitudinal channels of Bone called:
(1) Haversian canal
(2) Volkmann's canals
(3) Narrow cavity
(4) Lacunae

39. Glass like cartilage is:
(1) Hyaline cartilage
(2) Fibrous cartilage
(3) Calcified cartilage
(4) Elastic cartilage

40. Muscles are connected to Bone by means of:
(1) Cartilage (2) Ligaments
(3) Tendon (4) Adipose tissue

41. Our heart consists of:
(i) Epithelial tissue (ii) Connective tissue
(iii) Muscular tissue (iv) Neural tissue
(1) Only ii (2) i & iii only
(3) ii, iii & iv only (4) All of these

42. Major Inorganic components of Bone:
(1) Calcium phosphate
(2) Calcium carbonate
(3) Sodium hydroxide
(4) Potassium hydroxide

43. Supportive connective tissue means:
(1) Tendon
(2) Cartilage & Bone
(3) Ligaments
(4) Blood & Lymph

44. Inter vertebral disc are composed of:
(1) Hyaline cartilage
(2) Elastic cartilage
(3) White fibrous cartilage
(4) None of above

45. Hyaline cartilage found in:
(1) Santorini of larynx
(2) Tracheal Rings
(3) Epiglottis
(4) Eustachian tubes

46. Strongest cartilage is:
(1) White fibrous cartilage
(2) Elastic cartilage
(3) Hyaline cartilage
(4) Yellow fibrous

47. Epiglottis is composed of:
(1) Hyaline cartilage
(2) Calcified cartilage
(3) Both
(4) Elastic cartilage

48. Calcified cartilage is found in:
(1) Head of femur
(2) Diaphysis (shaft of long Bone)
(3) Articular surface of long Bone
(4) Coastal cartilage

49. Femur & Humerus are:
(1) Membranous Bone
(2) Investing Bone
(3) Cartilaginous Bone
(4) Sesamoid Bone

50. Patella is largest:
(1) Membranous Bone (Develop in dermis)
(2) Cartilage Bone (Replacing Bone)
(3) Heterotypic Bone (Visceral Bone)
(4) Sesamoid Bone (Develop in Tendon)

51. Epiphysis & Diaphysis of bone is:
(1) End and shaft of long bone respectively
(2) Shaft & end of long bone respectively
(3) Head & neck of long bone
(4) Spongy bone only

52. Haversian system is feature of:
(1) Amphibian Bones
(2) Reptiles Bone
(3) Pneumatic Bone
(4) Mammalian Bone

53. Haversian canals contain:
(1) Blood vessels & Nerves
(2) Blood vessels only
(3) Lymphatic only
(4) Connective tissue only

54. Perichondrium is:
(1) Adipose tissue
(2) White fibrous connective tissue
(3) Yellow elastic tissue
(4) Areolar connective tissue

55. The epithelial tissue present on the inner surface of bronchioles and fallopian tubes is:
(1) Squamous
(2) Cuboidal
(3) Glandular
(4) Ciliated

56. Fibroblast secretes:
(1) Matrix (2) Fibres
(3) Both (1) and (2) (4) Cells

57. Scavenger cells of alveoli called:
(1) Melanophage
(2) Monocytes / Macrophage
(3) Dust cell
(4) Microglial cell

58. Plasma cell is:
(1) Modified B - lymphocytes of blood
(2) Produces antigen
(3) Produce Heparin, Histamine, serotonin
(4) Produces matrix & Fibres

59. Mast cell secret:
(1) Anticoagulant: Heparin
(2) Vasodilator: Histamine
(3) Vasoconstrictor: Serotonin
(4) All of the above

60. Ligament and tendon are:
(1) Skeletal connective tissue
(2) Connective tissue of spleen
(3) Regular connective tissue
(4) Irregular connective tissue

61. Layer which connect skin with underlaying muscle are made up of:
(1) Epithelium tissue
(2) Yellow fibrous C. T.
(3) Adipose C. T.
(4) Areolar C. T.

62. Which protein is present in largest amount in human body?
(1) Collagen (2) Elastin
(3) Albumin (4) Keratin

63. Which of the following are specialised connective tissue?
(1) Cartilage (2) Bone
(3) Blood (4) All

64. Blood cells are produced by Bone in:
(1) Diaphysis (2) Epiphysis
(3) Metaphysis (4) All of these

65. Most of the cells present in areolar connective tissue are:
(1) Mast cell (2) Plasma cell
(3) Fibroblast (4) Macrophages

66. Cartilage is present in:
(1) Between adjacent bones of vertebral column and limb
(2) In middle of the long bone
(3) Vertebral end of ribs
(4) Posterior part of nasal septum

67. Which cartilage is present on the end of long bone?
(1) Hyaline cartilage
(2) Fibrous cartilage
(3) Calcified cartilage
(4) Elastic cartilage

68. Which of the following have hard and non-pliable ground substance?
(1) Cartilages (2) Bones
(3) Both (4) Areolar tissues

69. Mammalian ear pinna is supported by:
(1) Hyaline cartilage
(2) Calcified cartilage
(3) Elastic cartilage
(4) White fibrous connective tissue.

70. Loose connective tissue is:
(1) Areolar (2) Bone
(3) Blood (4) Cartilage

71. Ligament is:
(1) Modified white fibrous tissue
(2) Inelastic white fibrous tissue
(3) Modified elastic connective tissue
(4) None of the above.

72. Cartilage present in trachea, larynx and bronchi is:
(1) Fibrous (2) Elastic
(3) Hyaline (4) Calcified

73. Which is not a component of areolar tissue?
(1) Macrophage (2) Mast cell
(3) Schwann cell (4) Fibroblast

74. Nasal septum gets damaged. Its recovery requires cartilage called:
(1) Fibrous cartilage (2) Elastic cartilage
(3) Hyaline cartilage (4) Calcified cartilage

75. The most widely distributed connective tissue of the body is:
(1) Areolar tissue (2) Reticular CT
(3) Dense CT (4) Mucoid CT

76. Plasma cells secretes:
(1) Heparin
(2) Antibody
(3) Histamine
(4) Serotonin

77. Macrophages shows following characteristic
(1) Phagocytosis
(2) Lysosomes present
(3) Nucleus kidney shaped
(4) All of these

78. The cell junction concerned with mechanical support is:
(1) Interdigitation
(2) Desmosomes
(3) Macula adherense
(4) All of these

79. The kind of tissue that forms the supportive structure in our pinna (external ears) is also found in:
(1) Eustachian tube (2) Vertebrae
(3) Nails (4) Ear ossicles

ANSWER KEY

Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Ans.	3	4	1	1	2	4	3	1	4	3	4	2	4	3	2	1	4	1	1	1	1	1	1	1	4
Que.	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
Ans.	4	1	2	4	4	4	3	2	1	4	4	3	1	1	3	4	1	2	3	2	1	4	1	3	4
Que.	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**	**61**	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**
Ans.	1	4	1	2	4	3	3	1	4	3	4	1	4	2	3	1	1	2	3	1	3	3	3	3	1
Que.	**76**	**77**	**78**	**79**																					
Ans.	2	4	4	1																					

Exercise – II

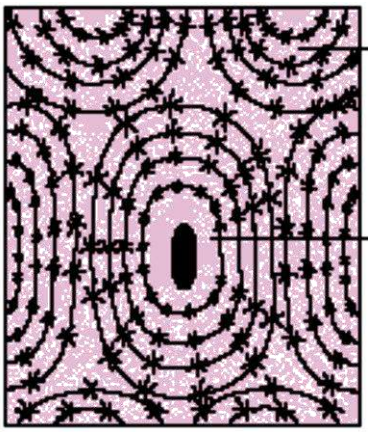
1. Read the following (A-D) statements.
A. It is made of more than one layer (multi-layered) of cells.
B. It has a limited role in secretion and absorption.
C. Their main function is to provide protection against chemical and mechanical stress
D. It covers the dry surface of the skin and the moist surface of buccal cavity.
How many of the above statements are correct for compound epithelium?
(1) Four (2) Three (3) Two (4) One

2. How many of the following substances are secreted by exocrine glands?
mucus, thyroxine, saliva, earwax, insulin, oil, milk, digestive enzymes, melatonin and adrenalin:
(1) Four (2) Five (3) Six (4) Seven

3. Which connective tissues are present **beneath** the skin?
A. Areolar tissue
B. Adipose tissue
C. Dense irregular connective tissue
(1) Only B (2) Only A
(3) Only A and B (4) All A, B and C

4. Read the following (A-D) statements: -
A. Connective tissue are most abundant and widely distributed in the body of complex animals
B. They are named connective tissues because of their special function of linking and supporting other tissues/organs of the body
C. They range from soft connective tissues to specialised types, which include cartilage, bone, adipose and blood
D. The cells of connective tissue secrete modified polysaccharides, which accumulate between cells and fibres and act as matrix
How many of the following statements are **correct**?
(1) Four (2) Three
(3) Two (4) One

5. Identify the given below tissue with its type and select the wrong option for the two together



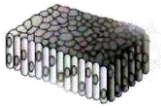
Option:

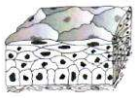
Tissue	**Type**
(1) Cartilage	Specialised connective tissue
(2) Tendon	Dense irregular connective tissue
(3) Ligament	Dense regular connective tissue
(4) Bone	Specialised connective tissue

6. Which of the following is **incorrect** statement for the **simple columnar epithelium?**
(1) It is composed of a single layer of tall and slender cells
(2) Their nuclei are located at the base
(3) Free surface may have microvilli
(4) They are found in the walls of blood vessels and air sac of lungs

7. Connective tissues include:
(a) Cartilage
(b) Bone
(c) Adipose tissue
(d) Blood
(1) a, b, and d (2) a, b and c
(3) b and d (4) All a, b, c and d

8. The four sketches (A, B, C and D) given below, represent four different types of animal tissues. Which one of these is correctly identified in the options given, along with its correct location and function?

(A)  (B) 

(C)  (D) 

		Tissue	Location	Function
(1)	B	Simple squamous epithelim	Fallopian tube	Transport of gamete
(2)	C	Simple cuboidial epithelium	Wall of blood Vessels and air sac of lungs	Diffusion boundary
(3)	D	Compound epithelium	Skin	Protection
(4)	A	Simple columnar Epithelium	Tubular part of nephron	Secretion

9. Read the following (A–D) Statements:

(A) Tight junctions help to stop substances from leaking across a tissue

(B) Adhering junctions perform cementing to keep neighbouring cells together

(C) The simple epithelium consists of two or more cell layers and has protective function

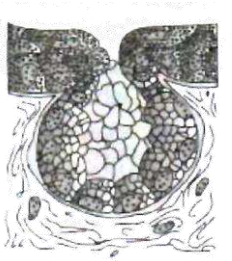
(D) The columnar epithelium is made of a single layer of fattened cells with irregular boundaries.

How many of the above statements are correct?

(1) Four (2) Three

(3) Two (4) One

10. Identify the glands (A) and (B) shown below and select the right option for location and function:

(A) (B)

		Gland	Location	Function
(1)	A	Unicellular Gland	Alveoli	Secrete Saliva
(2)	B	Multicellular gland	Oesophagus	Secrete enzyme
(3)	A	Multicellular gland	Alimentary Canal	Secrete Mucous
(4)	B	Multicellular gland	Buccal Cavity	Secrete Saliva

11. Which of the following is correct match of epithelial tissue?

(1)	Squamous epithelium	Bronchiloes and fallopian tube
(2)	Columnar epithelium	Ducts of glands and tubular part of nephron
(3)	Cuboidial epithelium	Walls of blood vessels and air sacs of lungs
(4)	Compound epithelium	Buccal cavity and pharynx

12. Read the following (A – D) statements:

(A) Areolar tissue is present beneath the skin

(B) Adipose tissue is a type of dense connective tissue

(C) Tendons attach one bone to another

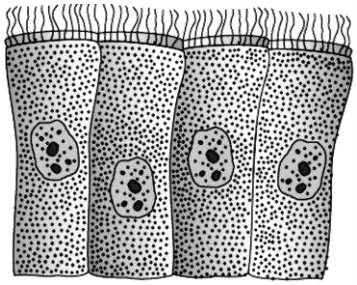
(D) Ligaments attach skeletal muscles to bones

How many of the above statements are **incorrect**?

(1) Four (2) Three

(3) Two (4) One

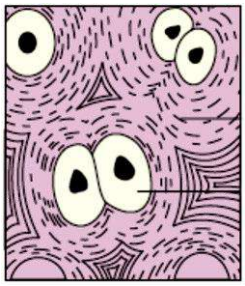
13. Which of the following is **correct** identification of the epithelium illustrated with function /characteristic?



(1) It is ciliated cuboidal epithelium, found in the ducts of the glands and tubular parts of the nephrons of kidneys
(2) It is brush border epithelium present in PCT
(3) It is ciliated columnar epithelium, present in bronchioles and fallopian tubes to move the particles or mucus in a specific direction
(4) Brush border columnar epithelium, to increase the surface area of small intestine

14. Largest organ of body that is skin has
(1) Dense regular connective tissue
(2) Dense irregular connective tissue
(3) Bones
(4) Vascular connective tissue

15.



The **false** fact about above diagram is –
(1) Matrix is solid and non-pliable
(2) Cells are chondrocytes
(3) Mostly are replaced by bones in adult
(4) Found at tip of nose

16. Minimum regeneration power is present in:
(1) Nervous tissue
(2) Connective tissue
(3) Epithelial tissue
(4) Muscular tissue

17. Which of the following cartilage is found at Joint of adjacent bones of vertebral column?
(1) Hyaline cartilage
(2) Elastic cartilage
(3) Calcified cartilage
(4) White fibrous cartilage

18. Ligament is mainly made up of:
(1) Reticulin (2) Elastin
(3) Myosin (4) Collagen

19. Which is a sesamoid bone?
(1) Patella (2) Femur
(3) Ulna (4) Pubis

20. Thin and Irregular boundary is not found in?
(1) Some part of nephron
(2) Endothelium of blood vessels
(3) Stomach
(4) Alveoli of lungs

21. Mostly bones of adult vertebrates are formed by the ossification of cartilage?
(1) Hyaline cartilage
(2) Elastic cartilage
(3) Calcified cartilage
(4) White fibrous cartilage

22. Which of the following is **true** for epithelium tissue?
(1) Mostly glands are made up of compound epithelium
(2) Mostly flat cells are specialized for secretion
(3) Cilia help in conduction of particles or mucous in specialized direction over connective tissue
(4) Free surface of cuboidal or columnar cells may have cilia

23. Which type of epithelium is found in Pancreatic duct?
(1) Simple cuboidal
(2) Stratified cuboidal
(3) Simple columnar
(4) Stratified columnar

24. Bones formed by ossification of a tendon is called:

(1) Membrane bone

(2) Sesamoid bone

(3) Dermal bone

(4) Cartilage

25. Which of the following is **true** for dense connective tissue?

(1) Provide framework for epithelium tissue

(2) Most abundant connective tissue

(3) Fibroblasts and fibres are compactly packed

(4) Cells are fibres are loosely arranged in semifluid matrix

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Ans.	1	3	3	1	4	4	4	3	3	4	4	2	3	2	1	1	4	2	1	3	1	4	2	2	3

Exercise – III (Previous Year Questions)

AIPMT – 2006

1. Areolar connective tissue joins:
(1) Fat body with muscles
(2) Integument with muscles
(3) Bones with muscles
(4) Bones with bones

2. Mast cells secrete:
(1) Hippurin (2) Myoglobin
(3) Histamine (4) Haemoglobin

AIIMS – 2006

3. The type of epithelial cells which line the inner surface of fallopian tubes, bronchioles and small bronchi are known as:
(1) Squamous epithelium
(2) Columnar epithelium
(3) Ciliated epithelium
(4) Cubical epithelium

AIPMT – 2007

4. In which one of the following preparations are you likely to come across cell junctions most frequently?
(1) Hyaline cartilage
(2) Ciliated epithelium
(3) Thrombocytes
(4) Tendon

AIPMT – 2009

5. The cell junctions called tight, adhering and gap junctions are found in:
(1) Neural tissue
(2) Muscular tissue
(3) Connective tissue
(4) Epithelial tissue

6. The kind of tissue that forms the supportive structure in our pinna (external ears) is also found in:
(1) Tip of the nose (2) Vertebrae
(3) Nails (4) Ear ossicles

7. The epithelial tissue present on the inner surface of bronchioles and fallopian tubes is:
(1) Squamous (2) Cuboidal
(3) Glandular (4) Ciliated

AIPMT-Pre – 2010

8. The kind of epithelium which forms the inner walls of blood vessels is:
(1) squamous epithelium
(2) cuboidal epithelium
(3) columnar epithelium
(4) ciliated columnar epithelium

AIIMS – 2010

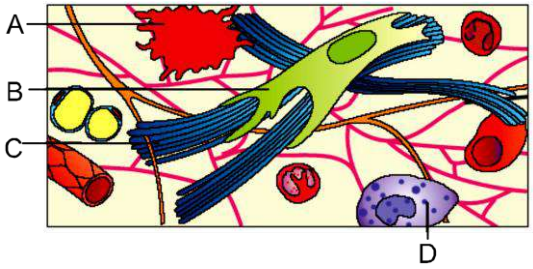
9. What is the similarity between bronchi and fallopian tube?
(1) Pseudostratified epithelium
(2) Ciliated epithelium
(3) Cuboidal epithelium
(4) Columnar epithelium

AIIMS – 2011

10. Tendon and ligaments are example of:
(1) Dense regular connective tissue.
(2) Dense irregular connective tissue.
(3) Loose connective tissue.
(4) Specialised connective tissue.

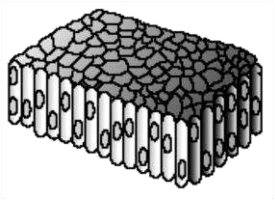
AIPMT-Mains – 2012

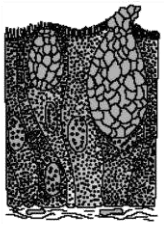
11. Given below is the diagrammatic sketch of a certain type of connective tissue. Identify the parts labelled A, B, C and D, and select the right option about them:

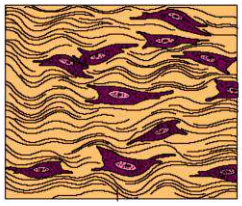


	Part A	Part B	Part C	Part D
(1)	Macrophage	Collagen fibres	Fibroblast	Mast cell
(2)	Mast cell	Collagen fibres	Fibroblast	Macrophage
(3)	Macrophage	Fibroblast	Collagen fibres	Mast cell
(4)	Mast cell	Macrophage	Fibroblast	Collagen fibres

12. The four sketches (A, B, C and D) given below, represent four different types of animal tissues. Which one of these is correctly identified in the options given, along with its correct location and function?

(A) 

(B) 

(C) 

(D) 

		Tissue	Location	Function
(1)	(D)	Smooth muscle tissue	Heart	Heart contraction
(2)	(A)	Columnar epithelium	Nephron	Secretion and absorption
(3)	(B)	Glandular epithelium	Intestine	Secretion
(4)	(C)	Collagen fibres	Cartilage	Attach skeletal muscles to bones

AIPMT – 2012

13. The supportive skeletal structures in the human external ears and in the nose tip are examples of:

(1) bone (2) cartilage

(3) ligament (4) areolar tissue

AIPMT – 2014

14. Choose the correctly matched pair:

(1) Tendon-Specialized connective issue

(2) Adipose tissue - Dense connective tissue

(3) Areolar tissue - Loose connective tissue

(4) Cartilage-Loose connective tissue

Re-AIPMT – 2015

15. The function of the gap junction is to:

(1) Stop substance from leaking across a tissue

(2) Performing cementing to keep neighbouring cells together

(3) Facilitate communication between adjoining cells by connecting the cytoplasm for rapid transfer of ions, small molecules and some large molecules

(4) Separate two cells from each other.

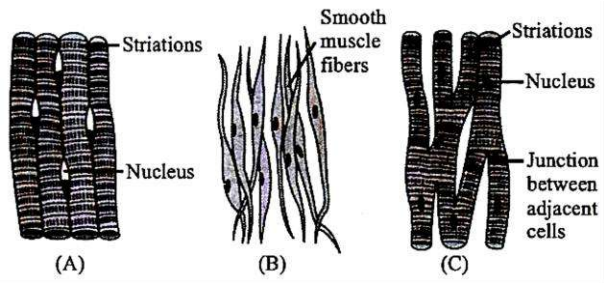
NEET – 2016

16. Which type of tissue **correctly** matches with its location?

	Tissue	Location
(1)	Smooth muscle	Wall of intestine
(2)	Areolar tissue	Tendons
(3)	Transitional epithelium	Tip of nose
(4)	Cuboidal epithelium	Lining of stomach

AIIMS – 2017

17. Select the correct match:



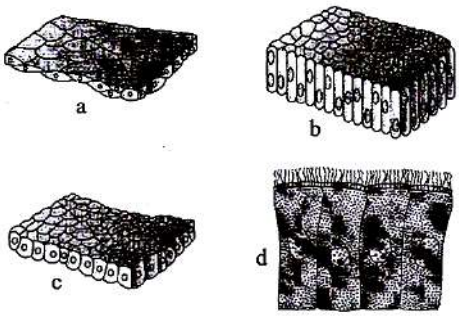
(1) A-Skeletal muscles → biceps, striated muscles, involuntary

(2) B-Smooth muscles → walls of stomach, voluntary

(3) C-Cardiac muscles → heart, dorsal wall of aorta, voluntary.

(4) A-Skeletal muscle → biceps, striated, voluntary

18. Pick the correct option with regards to given below figure.



(1) a = Squamous epithelium. Its function absorption.

(2) b = Cuboidal epithelium. Function = secretion only.

(3) c = Columnar epithelium. It forms the lining of stomach and intestine.

(4) d = ciliated columnar epithelium. It is found in fallopian tubules.

NEET – 2019

19. The ciliated epithelial cells are required to move particles or mucus in a specific direction. In humans, these cells are mainly present in:

(1) Eustachian tube and Salivary duct

(2) Bronchioles and Fallopian tubes

(3) Bile duct and Bronchioles

(4) Fallopian tubes and Pancreatic duct

NEET – 2019 (ODISHA)

20. Match the following cell structure with its characteristic feature:

(a)	Tight junctions	(i)	Cement neighbouring cells together to from sheet
(b)	Adhering	(ii)	Transmit junctions information throught chemical to another cells
(c)	Gap junctions	(iii)	Estabilish a barrier to prevent leakage of fluid across epithelial cells
(d)	synaptic	(iv)	Cytoplasmic juncations channels to facilitate communication between adjacent cells

(1) (a)-(ii), (b)-(iv), (c)-(i), d-(iii)

(2) (a)-(iv), (b)-(ii), (c)-(i), d-(iii)

(3) (a)-(iii), (b)-(i), (c)-(iv), d-(ii)

(4) (a) (iv), (b)-(iii), (c)-(i), d-(ii)

NEET – 2020

21. Goblet cells of alimentary canal are modified from:

(1) Compound epithelial cells

(2) Squamous epithelial cells

(3) Columnar epithelial cells

(4) Chondrocytes

22. Cuboidal epithelium with brush border of microvilli is found in:

(1) eustachian tube

(2) lining of intestine

(3) ducts of salivary glands

(4) proximal convoluted tubule of nephron

23. Which of the following is the most abundant protein in the animals ?

(1) insulin (2) Haemoglobin

(3) Collagen (4) Lectin

NEET – 2021

24. Identify the types of cell junctions that help to stop the leakage of the substances across a tissue and facilitation of communication with neighbouring cells via rapid transfer of ions and molecules.

(1) Gap junctions and adhering junctions and tight junctions, respectively.

(2) Tight junctions and gap junctions, respectively.

(3) Adhering junctions and tight junctions, respectively.

(4) Adhering junctions and gap junctions, respectively.

NEET – 2022

25. Which of the following is present between the adjacent bones of the vertebral column?

(1) Intercalated discs

(2) Cartilage

(3) Areolar tissue

(4) Smooth muscle

26. Which of the following is **not** a connective tissue ?

(1) Blood (2) Adipose tissue

(3) Cartilage (4) Neuroglia

RE-NEET – 2022

27. Which of the following types of epithelium is present in the bronchioles and Fallpian tubes?

(1) Simple squamous epithelium

(2) Simple columnar epithelium

(3) Ciliated epithelium

(4) Stratified squamous epithelium

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Ans.	2	3	3	2	4	1	4	1	2	1	3	3	2	3	3	1	4	4	2	3	3	4	3	2	2
Que.	**26**	**27**																							
Ans.	4	3																							