HUMAN ANATOMY AND PHYSIOLOGY-I, BP-101(T)

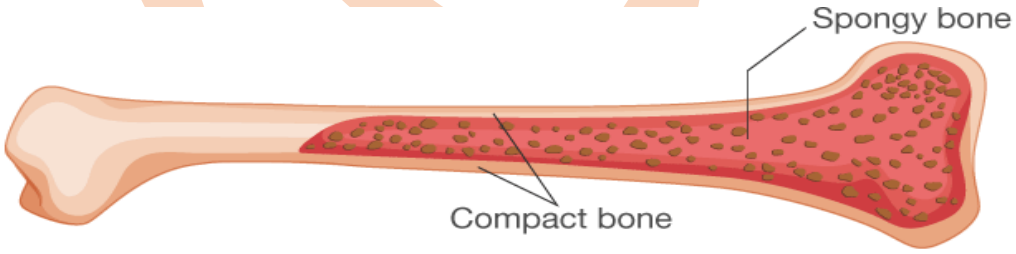
UNIT-II (Integumentary system)

CLASS:4

TOPIC – Salient features and functions of bones of axial skeletal system

Compact Bone:

- Compact bone consists of closely packed Osteons or Haversian systems.
- The osteon consists of a central canal called the Osteonic (haversian) canal, which is surrounded by concentric rings (lamellae) of matrix.
- Between the rings of matrix, the bone cells (osteocytes) are located in spaces called lacunae. Small channels (Canaliculi) radiate from the lacunae to the osteonic (Haversian)canal to provide passageways through the hard matrix.
- In compact bone, the haversian systems are packed tightly together to form what appearsto be a solid mass.
- The osteonic canals contain blood vessels that are parallel to the long axis of the bone.
- These blood vessels interconnect, by way of perforating canals, with vessels on the surface of the bone.



SPONGY BONE

- Spongy bone is also called cancellous or trabecular bone. It is found in the long bones and it is surrounded by compact bone.

COMPACT BONE

- Compact bone, also called cortical bone, surrounds spongy bone. They are heavy, tough and compact in nature

Spongy (Cancellous) Bone:

- Spongy (Cancellous) bone is lighter and less dense than compact bone.
- Spongy bone consists of plates (trabeculae) and bars of bone adjacent to small, irregular cavities that contain red bone marrow.
- The canaliculi connect to the adjacent cavities, instead of a central haversian canal, to receive their blood supply.
- It may appear that the trabeculae are arranged in a haphazard manner, but they are organized to provide maximum strength similar to braces that are used to support a building.
- The trabeculae of spongy bone follow the lines of stress and can realign if the direction of stress changes.

Illustration of compact and Spongy (cancellous) bone:

Feature	Compact Bone Tissue	Spongy Bone Tissue
Location	Outer layer of bones	Interior of bones
Structure	Densely packed osteons	Network of trabeculae
Appearance	Solid and dense	Honeycomb-like or spongy
Function	Provides strength and support	Supports metabolic needs and bone marrow production
Blood Supply	Central canals	Spaces between trabeculae
Density	Higher density	Lower density
Location in Bones	Diaphysis (shaft) and outer layer	Epiphysis (ends) and interior of flat/irregular bones

Classification of Bones:

- Illustration mapping the different components of a long bone:
- The bones of the body come in a variety of sizes and shapes.The

four principal types of bones are

1. Long
2. Short
3. Flat and
4. Irregular.

1. **Long Bones**
   - Bones that are longer than they are wide are called long bones.
   - They consist of a long shaft with two bulky ends or extremities.
   - They are primarily compact bone but may have a large amount of spongy bone at the ends or extremities.
   - Long bones include bones of the thigh, leg, arm, and forearm.

2. **Short Bones**
   - Short bones are roughly cube shaped with vertical and horizontal dimensions approximately equal.
   - They consist primarily of spongy bone, which is covered by a thin layer of compact bone.
   - Short bones include the bones of the wrist and ankle.

3. **Flat Bones**
   - Flat bones are thin, flattened, and usually curved.
   - Most of the bones of the cranium are flat bones.

4. **Irregular Bones**
   - Bones that are not in any of the above three categories are classified as irregular bones.
   - They are primarily spongy bone that is covered with a thin layer of compact bone.
   - The vertebrae and some of the bones in the skull are irregular bones.

- All bones have surface markings and characteristics that make a specific bone unique.
- There are holes, depressions, smooth facets, lines, projections and other markings.
- These usually represent passageways for vessels and nerves, points of articulation with other bones or points of attachment for tendons and ligaments.

Axial Skeleton (80 bones)

Skull: Bony structure of Head is called Skull (Highly organized and complex structure)

Functions of Skull:

- Skull protects and supports sensitive organs of the body like brain, eyes & ears.
- Movements in the head are due to cranial bones, which provides larger surface area for attachment of muscles.
- Cranial bones accommodate and stabilize the position of brain, cranial nerves and vessels.

- Facial bones form the framework of the face.
- Skull has various cavities which play an important role in communication of organs with environment
- The mandible and maxillae contain alveolar ridge in which teeth are present.
- These serve as supportive systems for entry into digestive and respiratory tracts.

Skull Bones (28)

Cranial Bones Parietal (2)

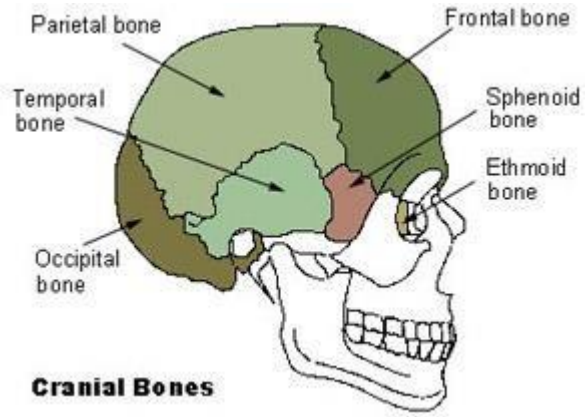
Temporal (2)

Frontal (1)

Occipital (1)

Ethmoid (1)

Sphenoid (1)



Cranial Bones

Facial Bones

Maxilla (2)

Zygomatic (2)

Mandible (1)

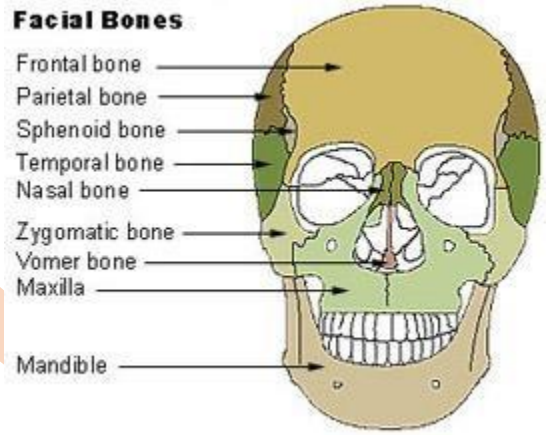
Nasal (2)

Platine (2)

Inferior nasal concha (2)

Lacrimal (2)-forming part of eye socket

Vomer (1)



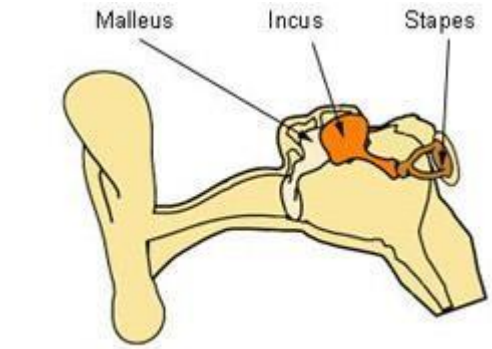
Auditory Ossicles

Malleus (2)

Incus (2)

Stapes (2)

- These are 3 small bones in middle ear that transmits vibrations



Cranial Bones

Vertebral Column:

- It is composed of bones and connective tissue.
- It is a flexible curved structure that provides axial support to the body.
- In this, the bones are called vertebrae.
- Vertebral column is formed by 26 irregular bones, which are connected and supported by ligaments.

IMPORTANT QUESTIONS:

2M QUESTIONS:

1. Define skin and its functions.
2. Enlist the layers of skin.
3. Define muscle tone
4. Differentiate osteoclast and osteoblast.
5. Define skeletal system and its functions.
6. Differentiate tendon and ligament.
7. Define muscle contraction.
8. Define neuromuscular junction
9. Explain largest and shortest bones of human body
10. Name the largest nerve of human body.
11. Define: 1. Joint
    2. Synovial joint with examples.

5M QUESTIONS:

1) Explain the physiology of muscle contraction.

2) Write in details about structure and functions of skin.

3) Write a note on different types of joints.

4) Write features and functions of bones of axial and appendicular skeletal system.

5) Write in details about synovial joints and their function with the help of diagram.

10M QUESTIONS:

1) Write a note on different types of joints.

2) Write features and functions of bones of axial and appendicular skeletal system.

3) Write in details about synovial joints and their function with the help of diagram.