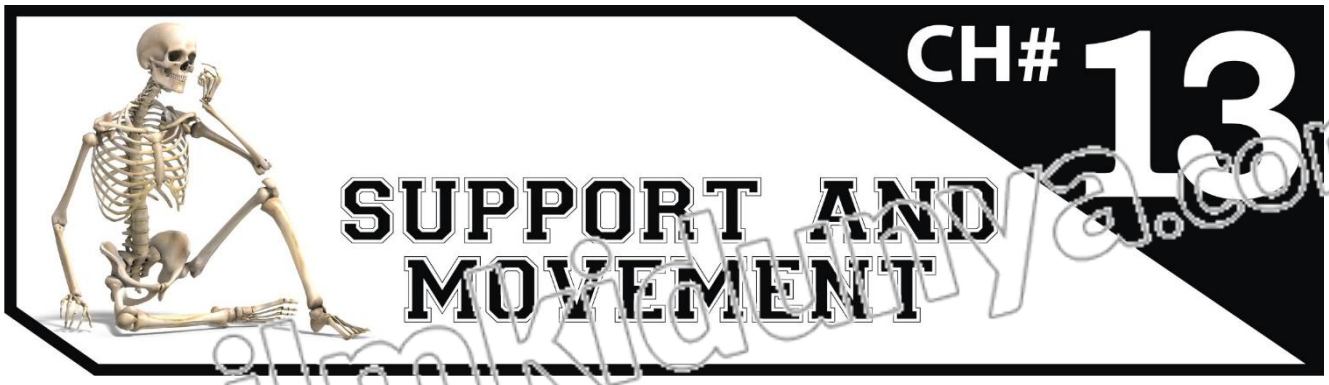


13.1 HUMAN SKELETON

LONG QUESTIONS

Q.1 Write a note on skeletal system. ***(K.B)*** **(LHR 2017)**

Ans:

SKELETAL SYSTEM

Definition:

"**Skeletal system** or **skeleton** is defined as the **framework** of **hard**, **articulated structures** that **provide physical support**, **attachment for skeletal muscles**, and **protection** for the **bodies of animals**".

Explanation:

Like other **vertebrates**, the **human skeleton** is on **the inside of body** and is called **Endoskeleton**. In the living body, the **skeleton** is very **much alive**. **Bones and cartilages** are made of **living cells** and also have **nerves** and **blood vessels** in them. They grow and have the **ability to repair themselves**.

Role:

The role of skeleton system are as follows:

- The big functions of skeleton system **are protection, support** and **movement**.
- In **our body, skeleton** works very closely with the **muscular system to help us move**.
- **Skeleton** provide **protection** to many **internal organs** e.g. **skull protects brain**, **vertebral column protects spinal cord** and **ribs protect** most of our other internal organs.
- **Vertebral column** also **provide** the main **support** to our **body mass**.

Q.2 Write a note on cartilage. **(LHR 2014, SWL 2015)**

Ans:

CARTILAGE

Definition:

"**Cartilage** is a **dense, clear, blue-white firm connective tissue. Cartilage is less strong than bone".**

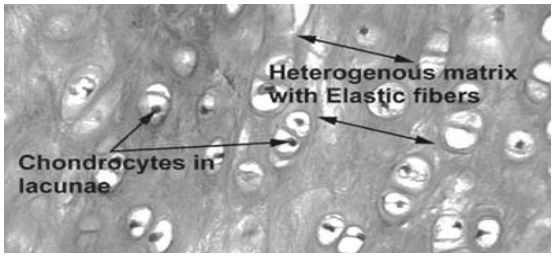


Figure: Chondrocytes in Cartilage Matrix

Explanation:

Chondrocytes:

The **cells of cartilage** are called **chondrocytes**.

Lacuna:

Each **chondrocyte lies** in a **fluid space** called **lacuna** present in the **matrix of cartilage**.

Collagen Fibers:

The **matrix of cartilage** contains **collagen fibers**.

Blood Vessels:

Blood vessels do not enter into the **cartilage**.

Types:

There are **three types** of cartilage:

- **Hyaline Cartilage**
- **Elastic Cartilage**
- **Fibrous Cartilage**

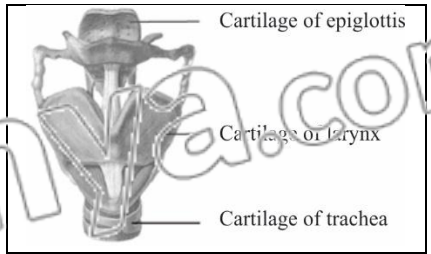
Hyaline Cartilage:

The **hyaline cartilage** is **strong** yet **flexible**.

Location:

It is found in:

- **Nose**
- **Larynx**
- **Trachea**
- **Bronchial Tubes**
- **Covering the ends of the long bones**



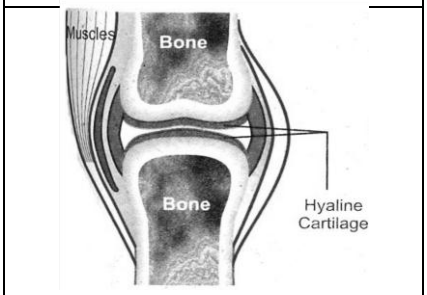


Figure: Hyaline Cartilage

Elastic Cartilage:

Elastic cartilage is similar in **structure** to the **hyaline cartilage**. It is also **quite strong** but has **elasticity** due to the **network of elastic fibers** in addition to **collagen fibers**.

Location:

It is found in:

- **Epiglottis**
- **Pinna**

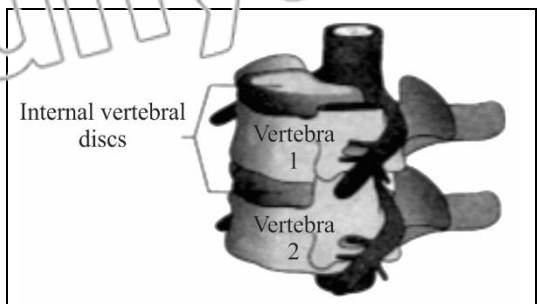


Figure: Fibrous Cartilage

Fibrous Cartilage:

Fibrous cartilage is very **tough** and **less flexible** due to the **large number of thick collagen fibers** present in **knitted** form.

Location:

It is **found in**:

- **Intervertebral discs**

Q.3 Explain structure of bone. ***(K.B)***

Ans: **BONE** **(DGK 2014)**

Definition:

"Bone is the **hardest type connective tissue** in the body **of animals".**

Functions:

The functions of bone are as follows:

- Bones help in **body movements**
- **Support body**
- **Protect** the various parts of body
- Produce **red** and **white blood cells**
- **Store minerals**

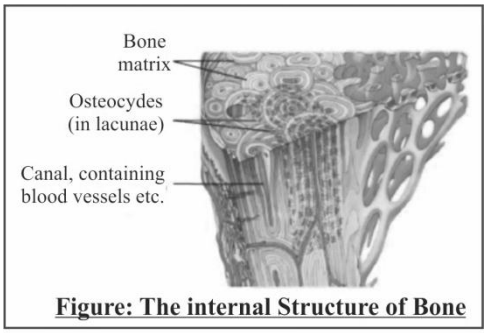


Figure: The internal Structure of Bone

STRUCTURE OF BONE

Compact Bone:

The **hard outer layer** of the bone is called **compact bone**.

Spongy Bone:

The **interior of the bone** is **soft** and **porous** and is called **spongy bone**. Spongy bone contains **blood vessels** and **bone marrow**.

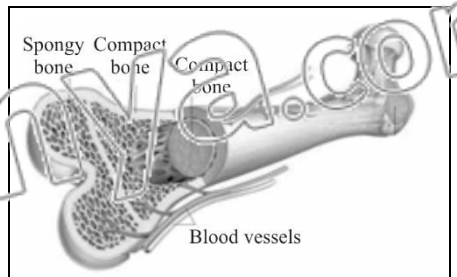


Figure: Compact and Spongy Bone

Composition of Bone Matrix:

The **matrix** of the bones contains:

- **Collagen**
- **Minerals (calcium and phosphate)**

Osteocytes:

Bone contains **different types of cells**. The mature **bone cells** are called **osteocytes**.

Soft Bone in Babies:

The **babies** are born with about **300 soft bones**. Some of these bones **later fuse together**, so that the adult skeleton has **206 hard bones**.

Q.4 Count the bones of human skeleton. ***(K.B)***

OR

What are the main components of the axial skeleton and the appendicular skeleton of human? ***(K.B)*** **(Understanding the Concept Q.1)**

Ans:

COMPONENTS OF HUMAN SKELETON

The **206 bones** in the adult human skeleton are organized into a **longitudinal axis** i.e. **axial skeleton**, to which **appendicular skeleton** is attached.

AXIAL SKELETON

Number of Bones:

Axial skeleton consists of the **80 bones** in the **head** and **trunk** of the body.

Parts:

It is composed of **five parts**:

Skull:

Skull contains **22 bones out** of which:

- **8 are cranial bones** (enclosing the brain)
- **14 are facial bones**

Middle Ear Ossicles:

There are **6 middle ear ossicles** (3 in each ear).

Hyoid Bone:

There is a **hyoid bone** in the **neck**.

Vertebral Column:

Vertebral column contains 26 bones (vertebrae).

Chest:

The **chest** is made up of:

- A **chest bone** is called **sternum**
- **24 (12 pairs) ribs**

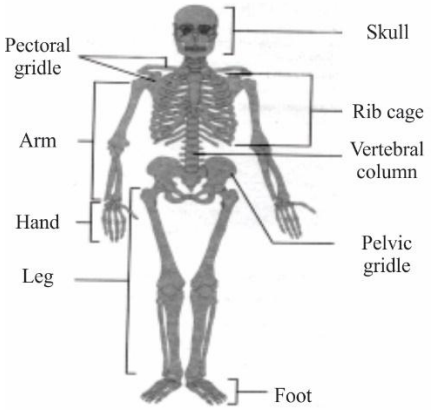


Figure: Human Skeleton

APPENDICULAR SKELETON

Number of Bones:

Appendicular skeleton is composed of **126 bones**.

Pectoral Girdle:

Pectoral (shoulder) girdle is made up of **4 bones.**

Arms:

Both **arms** have **6 bones**.

Hands:

Both **hands** have **54 bones**.

Pelvic Girdle:

Pelvic girdle (hips) has **2 bones**.

Legs:

Both legs have **6 bones**.

Feet:

Both feet have **54 bones**.

13.1 SHORT QUESTIONS

Q.1 Why organisms need support? *(U.B)*

Ans:

NEED OF SUPPORT

The organisms with greater sizes need support to keep their body mass as one unit. This is particularly true for the organisms that live on land.

Q.2 What is movement? *(K.B)*

Ans:

MOVEMENT

The act of changing place or position by entire body or by its parts of organisms is called movement

Types:

There are two types of movement.

- Movement of body parts
- Locomotion

Q.3 Define locomotion. *(K.B)*

Ans:

LOCOMOTION

Definition:

"The movement of an animal as a whole from one place to another is called Locomotion".

Q.4 Define cartilage and give example also. *(K.B)* **(GRW 2016)**

Ans: Page no 100.

Q.5 Define skeleton? *(K.B)*

Ans: Page no 100.

Q.6 Write two functions of bones. *(A.B)*
LHR 2015

Ans: Page no 101.

Q.7 What are the advantages of skeleton? *(A.B)*

Ans:

ADVANTAGES OF SKELETON

The advantages of skeleton are as follows:

- Physical support
- Attachment for skeletal muscles
- Protection for the bodies of animals
- Movement

Q.8 Write down the number of bones in pectoral girdle and pelvic girdle. *(KS.B)* **GRW 2017**

Ans: Page no 102.

Q.9 What is difference between endoskeleton and exoskeleton? *(K.B)* **(GRW 2017, MTN 2015, DGK 2015)**

Ans:

DIFFERENTIATION

The differences between endoskeleton and exoskeleton are as follows:

Endoskeleton	Exoskeleton
Definition	
• The skeleton which is inside the body of an organism is called endoskeleton	• The skeleton which is on the outside of the body of an organism is called exoskeleton
Example	
• Skeleton of Human	• Skeleton of Arthropods

Q.10 Write the name of largest and smallest bone of human skeleton. ***(K.B)***

Ans:

BONE

Largest Bone:

The largest bone of human skeleton is femur (Thigh bone).

Smallest Bone:

The smallest bone of human skeleton is stirrup (located in ear).

Q.11 What is the role of skeletal system? ***(K.B)***

Ans: Page no 100.

Q.12 What are chondrocytes and osteocytes? ***(K.B)***

Ans:

CHONDROCYTES AND OSTEOCYTES

Chondrocytes:

"Cartilage contain a single type of cell these are called chondrocytes."

Osteocytes:

"Bones contain different types of cell. The mature bone cells are called osteocytes."

Q.13 What are difference between bones and cartilage? ***(K.B)***

(LHR 2014, 2015, GRW 2014, BWP 2015)

Ans:

DIFFERENTIATION

The difference between bones and cartilage is as follows:

Cartilage	Bones
• Cartilage is a dense clear blue white firm connective tissue (but less strong then bones).	• Bones is the hardest connective tissue in body. Bones not only move support and protect various part of body, but also produce red and white blood cells and store minerals.

Q.14 What is Rheumatoid Arthritis? Write its symptoms. **LHR 2015**

Ans: Page no 114.

Q.15 Define bone and give example. ***(K.B)*** **(LHR 2016, GRW 2016)**

Ans: Page no 114.

Q.16 What is compact bone and spongy bone? ***(K.B)*** **(GRW 2013, 2014, MTN 2015)**

OR

Differentiate between compact bone and spongy bone. ***(K.B)*** **(LHR 2017)**

Ans: Page no 115.

Q.17 What are tendon and ligaments? ***(K.B)*** **(LHR 2015, BWP 2014, 2015)**

Ans: Page no 115.

Q.18 What is elastic cartilage? ***(K.B)*** **(GRW 2015)**

Ans: Page no 115.

Q.19 What is the contribution of Andreas Vesalius? ***(K.B)***

Ans:

CONTRIBUTION OF ANDREAS VESALIUS

Period Year:

1514AD-1564 AD

Place of Birth:

He was born in Brussels, Belgium

Contribution:

He was honored for developing modern anatomical studies. He made many discoveries in anatomy based on studies made by dissection of human dead bodies.

Book Contents:

His book contained the most accurate depictions of the whole skeleton and muscles of the human body.

Q.20 Discuss the evolution of ear bones and jaws in mammals? *(K.B)* **(Do you know Pg. # 61)**

Ans: **EVOLUTION OF EAR BONES AND JAWS IN MAMMALS**

The upper jaw is fixed with the skull and is compressed of two bones. The lower jaw is mobile and articulates with the skull. In lower vertebrates, the lower jaw is made up of more than one bone while in mammals, it is made of single bone. During evolution, mammals modified the lower Jaw bones and incorporated four of them into the middle (in the form of malleus and incus in both ears). This adaptation proved beneficial for mammals. Lower jaw with single bone in stronger and the malleus and incus also improve hearing.

13.1 MULTIPLE CHOICE QUESTIONS

1. Which of the following inhabitants need more support than others? *(U.B)*
(A) Fresh water (B) Land
(C) Marine water (D) Both a & c

2. Locomotion and movement is the particular character of *(U.B)*
(A) Animals (B) Plants
(C) Fungi (D) All prokaryotes

3. Change in place of entire body of an organism is termed as *(U.B)*
(A) Support (B) Locomotion
(C) movement (D) Metastasis

4. The skeleton present inside the body is called: *(K.B)*
(A) Exoskeleton (B) Endoskeleton
(C) Cartilage (D) Ligament

5. The functions of skeletal system: *(A.B)*
(A) Protection (B) Support
(C) Movement (D) All of these

6. Which of the following is incorrect regarding to skeleton? *(U.B)*
(A) Living structure (B) Articulated structure
(C) Hard framework (D) Immobile structures

7. The purpose of rib cage is to _____. *(A.B)* **(LHR 2013, GRW 2017)**
(A) Protect the stomach (B) Protect the spinal cord
(C) Protect the heart and lungs (D) Provide an object to which the lungs can attach

8. Fluid filled space in the matrix of cartilage: *(K.B)*
(A) Chondrocyte (B) Lacuna
(C) Fibre (D) Hyaline

9. Cells of cartilage: *(K.B)*
(A) Chondrocytes (B) Osteocytes
(C) Fiber (D) Collagen

10. The hard outer layer of bone is called: *(K.B)* **(BWP 2015, GRW 2017)**
(A) Compact bone (B) Spongy bone
(C) Ligament (D) Tendon

11. Skeleton of arthropods: *(K.B)* **(DGK 2014)**
(A) Hydrostatic (B) Exoskeleton
(C) Endoskeleton (D) Axial Skeleton

12. The matrix of cartilage contains: *(K.B)*
(A) Glycogen (B) Murein
(C) Peptidoglycan (D) Collagen

13. Date of death of Andreas Vesalius: ***(K.B)***
(A) 1560 AD (B) 1562 AD
(C) 1564 AD (D) 1566 AD

14. Spinal cord is protected by ***(K.B)***
(A) Skull (B) Vertebral column
(C) Ribs (D) Femur

15. The main support to the body parts is given by ***(U.B)***
(A) Pectoral girdle (B) Vertebral column
(C) Ribs (D) Pelvic girdle

16. Most of the internal organs are protected by ***(U.B)***
(A) Skull (B) Pelvic girdle
(C) Ribs (D) Vertebral column

17. Place of birth of Andreas Vesalius: ***(K.B)***
(A) Belgium (B) America
(C) England (D) France

18. The appendicular skeleton is made up of bones. ***(K.B)*** **(LHR 2013)**
(A) 126 (B) 56
(C) 8 (D) 6

19. Number of parts of axial skeleton: ***(K.B)***
(A) 3 (B) 5
(C) 7 (D) 9

20. Total number of bones in skull: ***(K.B)*** **(BWP 2014, LHR 2015, GRW 2016)**
(A) 20 (B) 22
(C) 24 (D) 26

21. Number of ossicles in each ear: ***(K.B)***
(A) 3 (B) 6
(C) 9 (D) 12

22. Total number of vertebrae in human skeleton: ***(K.B)***
(A) 31 (B) 26
(C) 35 (D) 37

23. Total number of ribs in human skeleton: ***(K.B)***
(A) 12 (B) 24
(C) 36 (D) 48

24. Total number of bones in appendicular skeleton: ***(K.B)*** **(MTN 2015, GRW 2016)**
(A) 120 (B) 80
(C) 116 (D) 126

25. Number of bones in pectoral girdle: ***(K.B)***
(A) 2 (B) 4
(C) 6 (D) 8

26. Total number of bones in both arms: ***(K.B)***
(A) 3 (B) 4
(C) 5 (D) 6

27. Total number of bones in one hand: ***(K.B)***
(A) 14 (B) 27
(C) 42 (D) 56

28. Number of bones in pelvic girdle: ***(K.B)***
(A) 1 (B) 2
(C) 3 (D) 4

29. Number of bones in both legs: ***(K.B)***

(A) 4 (B) 8

(C) 12 (D) 16

30. Cartilage and bones are the types of _____ tissues in animals. ***(K.B)*** **(GRW 2013)**

(A) Ground (B) Supporting

(C) Connective (D) Columns1

31. Cartilage found in intervertebral disc is: ***(K.B)***

(A) Hyaline (B) Fibrous

(C) Matrix (D) Elastic

32. Which bone is the longest bone in human body? ***(K.B)***

(A) Skull (B) Vertebrae

(C) Thigh (D) Arm

33. A fluid space present in the matrix of cartilage containing chondrocytes ***(K.B)***

(A) Ligament (B) Lignin

(C) Lacuna (D) Lymph

34. He made many discoveries in anatomy, based on studies made by dissection of human dead bodies: ***(K.B)***

(A) Lamarck (B) Andreas Vesalius

(C) Andrea Caesalpino (D) Aristotle

35. Cartilage of epiglottis is an example of: ***(U.B)*** **(DGK 2015)**

(A) Elastic cartilage (B) Hyaline cartilage

(C) Fibrous cartilage (D) Ligament

36. Cartilage of larynx is an example of: ***(U.B)***

(A) Fibrous cartilage (B) Hyaline cartilage

(C) Elastic cartilage (D) Ligament1

37. Cartilage of trachea is an example of: ***(U.B)***

(A) Hyaline cartilage (B) Fibrous cartilage

(C) Elastic cartilage (D) Tendon

38. The skeleton found outside the body is called: ***(K.B)*** **(LHR 2016)**

(A) Endoskeleton (B) Exoskeleton

(C) Hydro skeleton (D) Fibro skeleton

39. Some bones prepare: ***(K.B)*** **(LHR 2016)**

(A) Mucous (B) Blood cells

(C) Oxygen (D) Hormones

40. Number of bones in both feet are: ***(K.B)*** **(LHR 2017)**

(A) 54 (B) 13

(C) 21 (D) 12

13.2 TYPES OF JOINTS

LONG QUESTIONS

Q.1 What is a joint? Explain different types of joints. *(K.B)*
(LHR 2015, 16, 17 BWP 2014, GRW 2014,17 DGK 2014, MTN 2015)
OR
Describe the types of joint and give example. *(K.B)* **(Understanding the Concept Q.2)**

Ans:

JOINTS

Definition:
"The **location at** which **two** or **more bones make contact** is called as **joint**."

Examples:
Knee joint and **elbow joint**.

Explanation:

Functions:
The **functions** of joints are as follows:
- Allow **movement**
- Provide **mechanical support**

Basis of Classification:
The joints can be classified on the basis of the **degree of movement** they **allow**.

TYPES OF JOINTS

Following are the **three main types** of joints:
- **Immovable (fixed) Joints**
- **Slightly Movable Joints**
- **Movable Joints**

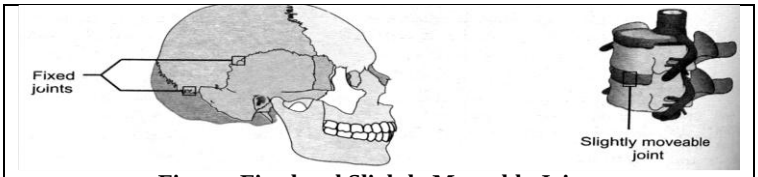


Figure: Fixed and Slightly Moveable Joints

Immovable (fixed) Joints:
Such joints **allow no movement.**

Example:
- Joints between the **skull bones**.

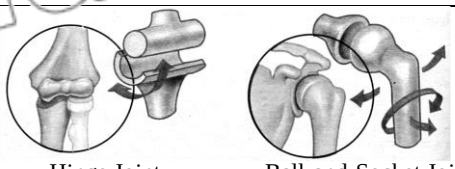
Slightly Movable Joints:
Such joints allow **slight movements**.

Examples:
- Joints between the **vertebrae**.

Movable Joints:
They allow a **variety of movements**. There are many types of **movable joints** in the body. The main types are as follow:
- **Hinge joints**
- **Ball-and-socket joints**

Hinge Joints:
These joints move **back and forth** like the **hinge on the door** and allow movements in one **plane only**.

Examples:
- **Knee joint**
- **Elbow joint**


Hinge Joint Ball-and-Socket Joint
Figure: Two Types of Moveable Joints

Ball-and-Socket Joints:
These joints allow movements in **all directions**.

Examples:
- **Hip joint**
- **Shoulder joint**

Q.2 What are ligaments and tendons? What function do they perform? *(K.B)* **(Understanding the Concept Q.3)**

Ans: **TENDONS AND LIGAMENT**

Tendons:

Tendons are **bands of connective tissues** (made of collagen).

Functions:

The **functions of tendons** area as follows:

- Tendons are **tough bands**.
- They **attach muscles** to **bones**.
- When a **muscle contracts** tendon **exerts pulling force** on the **attached bone**, which moves as **result**.

Ligament:

Ligaments are bands of **connective tissues**.

Functions:

The functions of ligament are as follows:

- Ligaments are **strong** but **flexible bands**.
- They join one **bone** to another **at joints**.
- They **prevent dislocation** of **bones at joints**.

13.2 SHORT QUESTIONS

Q.1 What do you know about the movement of neck joint? ***(U.B)***

Ans: **MOVEMENT OF NECK JOINT**

The neck joint between vertebral column and head allows movement side to side.

Q.2 Differentiate between tendon and ligament. ***(K.B)*** **(GRW 2017)**

OR

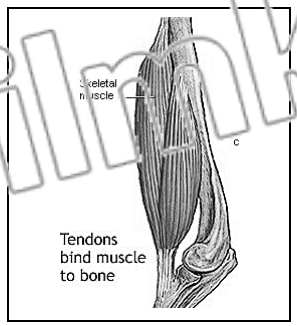
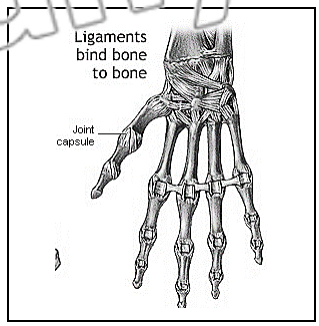
What is tendon? What is their function? ***(K.B)*** **(GRW 2016)**

OR

Define ligaments. ***(K.B)*** **(LHR 2017)**

Ans: **DIFFERENTIATION**

The differences between tendon and ligament are as follows:

Tendon	Ligament
• They attach muscles to bones. • When a muscle contracts tendon exerts pulling force on the attached bone, which moves as result. 	• They join one bone to another at joints. • They prevent dislocation of bones at joints. 

Q.3 What are the main types of movable joints? ***(K.B)***

Ans: Page no 108.

Q.4 What do you know about hinge joint? *(U.B)*
Ans: Page no 108.
Q.5 How ligament prevent dislocation at joints? *(U.B)*
Ans: Page no
Q.6 What are ball and socket joints? Give examples. *(K.B)* **(GRW 2016)**
Ans: Page no 108.

13.2 MULTIPLE CHOICE QUESTIONS

1. An example of immovable joint: *(K.B)*
(A) Skull (B) Vertebrae
(C) Elbow (D) Shoulder

2. The location where two or more bones make contact is called *(K.B)*
(A) Socket (B) Hinge
(C) Joint (D) Cartilage

3. Which of the following joint is not an example of fixed joint? *(K.B)*
(A) Joints between skull bones (B) Joints between Vertebrae
(C) Joints between ribs & sternum (D) Joints between cranial bones

4. The joints which allow movement is all directions is *(K.B)*
(A) Hinge joint (B) Ball & socket joint
(C) Cranial joints (D) Vertebral joints

5. An example of slightly moveable joint: *(K.B)*
(A) Hip (B) Knee
(C) Vertebrae (D) Skull

6. An example of hinge joint: *(K.B)* **(SWL 2015)**
(A) Skull (B) Hip
(C) Shoulder (D) Elbow

7. Neck joint between vertebral column and head is *(K.B)*
(A) Hinge joint (B) Ball & socket joint
(C) Slightly moveable joint (D) Pivot joint

8. An example of ball-and-socket joint: (*K.B)* **(LHR 2014)**
(A) Vertebrae (B) Shoulder
(C) Elbow (D) Knee

9. Which prevent dislocation of joints? *(A.B)*
(A) Cartilage (B) Tendons
(C) Ligaments (D) Bones

10. _____ are tough bands and attach muscles to bones. *(U.B)*
(A) Ligament (B) Tendon
(C) Origin (D) Insertion

11. _____ are strong but flexible bands and join one bone to another at joints: *(U.B)*
(A) Tendon (B) Ligament
(C) Flexor (D) Extensor

13.3 MUSCLES AND MOVEMENT

LONG QUESTIONS

Q.1 Explain the role of muscles in movements. ***(A.B)*** **(GRW 2014, BWP 2015)**

OR

Explain antagonism in muscle action selecting biceps and triceps as example. ***(A.B)*** **(Understanding the Concept Q.4)**

Ans: **ROLE OF MUSCLES IN MOVEMENTS**

Movements in Bones:

The **movements in bones** are brought about by the **contractions of skeletal muscles**, which are **attached** with them **by tendons**.

- **One end** of a skeletal muscle is always attached with **some immovable bone**. This end of muscle is **called the origin.**
- The other end of the muscle is attached with a **movable bone** and is called the **insertion**.

Contraction of Muscle:

When a muscle is **stimulated** by a nerve **impulse**, it contracts to become **shorter** and **thicker**. Due to its **contraction**, it pulls the **movable bone** (at insertion).

Antagonism: (Opposite Movement of Skeletal Muscles)

Skeletal muscles are usually in **pairs of antagonists**. In the **antagonist pair,** both muscles do **opposite jobs**. When one **muscle contracts** the **other relaxes** and this phenomenon is known as antagonism.

Flexion:

When a **muscle contracts** and **bends** the **joint**, this movement is called **flexion** and the muscle for this movement is known as **flexor**.

Extension:

When a muscle **contracts** and **straightens the joint**, this movement is called **extension** and the **muscle for** this movement is called **extensor**.

Example of Antagonism:

Biceps:

It is a **flexor muscle** on **the front of the upper arm bone**.

Triceps:

It is an **extensor muscle** on the **back of arm**.

Origin and Insertion:

Both these muscles have their **origin at pectoral girdle** and **insertion** at one of the two bones of **forearm**.

Contraction of Biceps:

When **biceps contracts**, the **forearm** (insertion end) is **pulled upward**. It is the **flexion** of elbow joint. During this flexion, **triceps** muscle **relaxes**.

Contraction of Triceps:

When **triceps** muscle **contracts**, **forearm** is **pulled down.** It is the **extension** at elbow joint. During this, biceps muscle **relaxes**.

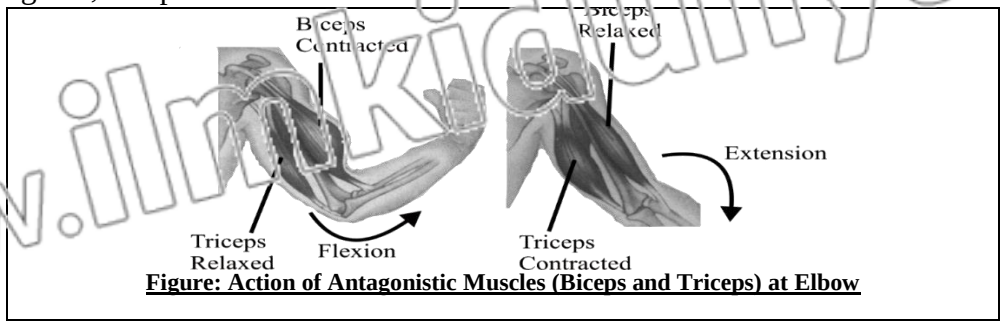


Figure: Action of Antagonistic Muscles (Biceps and Triceps) at Elbow

Antagonistic Pair of Muscles:

In this way, **biceps** and **triceps** make up an **antagonistic pair** of muscles. **Similar pairs**, working **antagonistically across** other joints, provide for almost all the **movements of skeleton**.

13.3 SHORT QUESTIONS

Q.1 What is origin and insertion? (K.B) **(LHR 2014, GRW 2014)**

OR

Differentiation between origin and insertion of skeleton muscles. (K.B) **(GRW 2016, 17)**

Ans: Page no 111.

Q.2 Define antagonism. (K.B) **(LHR 2016)**

Ans: Page no 111.

Q.3 What are flexor and extensor? (K.B) **(DGK 2015)**

OR

Differentiate between flexor and extensor. (K.B) **(LHR 2016)**

Ans:

FLEXOR

When a muscle contracts and bends the joints, it is known as flexor muscle and the movement is called flexion.

EXTENSOR

When a muscle contracts and straightens the joint, it is known as extensor muscle and the movement is called extension.

Q.4 What are biceps and triceps muscles? (K.B) **(LHR 2015, 16)**

Ans: Page no 111.

Q.5 Why aquatic animals need less support? (U.B)

Ans:

SUPPORT OF AQUATIC ANIMALS

Aquatic animals need less support because buoyancy force of water gives them support well.

Q.6 Which point of attachment is pulled when a muscle contracts? (U.B)

Ans:

CONTRACTION OF MUSCLE

Insertion is pulled when a muscle contracts to produce movement in the bones.

Q.7 Can muscle pushed? (U.B)

Ans:

MUSCLE

Muscles can only pull or contract. It cannot push.

Q.8 Write some activities that require combine action of several muscles. (A.B)

Ans:

COMBINE ACTION OF MUSCLES

Most activities in our body require combined action of several of muscles. Like:

- Walking
- Running
- Playing
- Speaking

13.3 MULTIPLE CHOICE QUESTIONS

1. The end of skeletal muscle attached with immovable bone is called: (K.B) **(LHR 2017)**

(A) Insertion (B) Origin
(C) Extension (D) Flexion

2. The end of muscle attached with movable bone: (K.B) **(LHR 2013)**

(A) Extension (B) Flexion
(C) Insertion (D) Origin

3. When a muscle contracts, it becomes: (K.B)

(A) Longer and thinner (B) Longer and thicker
(C) Shorter and thinner (D) Shorter and thicker

4. When a muscle relaxes, it becomes: (K.B)

(A) Longer and thinner (B) Longer and thicker
(C) Shorter and thinner (D) Shorter and thicker

5. When a muscle contracts and bends the joint, it is called as: (K.B)

(A) Flexor (B) Extensor
(C) Flexion (D) Extension

6. When a muscle contracts and straightens the joint, it is called as: (K.B)

(A) Flexor (B) Extensor
(C) Flexion (D) Extension

7. Bending of arm at elbow joint: (K.B)

(A) Flexor (B) Flexion
(C) Extension (D) Extensor

13.4 DISORDERS OF SKELETAL SYSTEM

LONG QUESTIONS

Q.1 Write a note on osteoporosis. (A.B) **(DGK 2015)**

Ans: **OSTEOPOROSIS**

Definition:

"Osteoporosis is the bone disease in adults, especially in old people. It is more common in old women".

Effects:

In osteoporosis, there is a decrease in the density of bones due to the loss of calcium and phosphorus.

Causes:

It may be due to:

- Malnutrition
  - Lack of proteins
  - Lack of vitamin C
- Lack of physical activities
- Deficiency of estrogen hormone

Effect of Old Age:

In old age, there is decreased secretion of growth hormones and it also leads to decreased deposition of minerals in bone matrix.

Q.2 Write a note on arthritis and its types. (A.B) **(LHR 2016, GRW 2017)**

Ans: **ARTHRITIS**

Definition

"Arthritis means "inflammation in joints". It is very common in old age and in women.

Symptoms:

It is characterized by:

- Pain
- Stiffness in joints

Affected Joints:

The most affected joints are the weight bearing joints.

Examples:

- Hip joint
- Ankle joint

Treatment:

The treatment of arthritis includes

- Pain killers
- Anti-inflammatory medicines.

Types:

There are many types of arthritis. Some are as follow:

- Osteo-arthritis
- Rheumatoid Arthritis
- Gout

1. **Osteo-Arthritis:**
   - It is due to degeneration in the cartilage present at joints or due to decreased lubricant production at joints.
   - In this arthritis, fusion of bones at joints may occur and joints may become totally immovable.
2. **Rheumatoid Arthritis:** **(DGK 2014)**

It involves the inflammation of the membranes at joints.

Symptoms:

Its symptoms include:

- Fatigue
- Low grade fever
- Pain in joints
- Stiffness in joints

3. **Gout:**
   - It is characterized by the accumulation of uric acid crystals in movable joints. It generally attacks the toe joints.

13.4 SHORT QUESTIONS

Q.1 Define osteoporosis. (K.B) **(GRW 2013, LHR 2015)**

Ans: Page no 113.

Q.2 What are causes of osteoporosis? (K.B) **(LHR 2013)**

Ans: Page no 113.

Q.3 What is osteoarthritis? (K.B) **(LHR 2016, GRW 2013, 14, 17, BWP 2015)**

Ans: Page no 114.

Q.4 Write function of esterogen. (A.B)

Ans:

FUNCTION OF ESTEROGEN

The function of esterogen is as follow:

Estrogen is deposit minerals in bones. When the reproductive cycle stops in females, not enough esterogen is secreted.

Q.5 What is rheumatoid arthritis? (K.B) **(LHR 2015, 17)**

Ans: Page no 114.

Q.6 Differentiate between osteo-arthritis and rheumatoid arthritis. (K.B) **(GRW 2016)**

Ans:

DIFFERENTIATION

The difference between Osteo-arthritis and rheumatoid arthritis is as follows:

Osteo-Arthritis	Rheumatoid Arthritis
• It is due to degeneration in the cartilage present at joints or due to decreased lubricant production at joints.	• It involves the inflammation of the membranes at joints.

Q.7 Define arthritis its treatment and symptoms. (A.B) **(LHR 2016)**

Ans: Page no 113, 114.

Q.8 What is gout? (K.B) **(LHR 2015, GRW 2016)**

Ans: Page no 114.

13.4 MULTIPLE CHOICE QUESTIONS

1. The inflammation of the joints is called: (K.B)

(A) Osteoporosis (B) Asthma
(C) Arthritis (D) Emphysema

2. Disease of bones in which there is a decrease in the density of the bones due to loss of calcium and phosphorus is: (U.B) **(LHR 2013)**

(A) Osteoporosis (B) Osteoarthritis
(C) Rheumatoid arthritis (D) Gout

3. Osteoporosis may be due to: (K.B)

(A) Lack of proteins and vitamin C (B) Lack of physical activities
(C) Deficiency of estrogen hormone (D) All of these

4. It involves the inflammation of the membranes at joints: (K.B)

(A) Osteoporosis (B) Gout
(C) Rheumatoid arthritis (D) Osteo-arthritis

5. It is one of the function of ____ to deposit minerals in bones when the reproductive cycle stops in females: (U.B)

(A) Progesterone (B) Estrogen
(C) Oxytocin (D) Thyroxin

ANSWER KEY

MULTIPLE CHOICE QUESTIONS

13.1 HUMAN SLELETON

1	B	**2**	A	**3**	B	**4**	B	**5**	D	**6**	D
7	C	**8**	B	**9**	A	**10**	A	**11**	B	**12**	D
13	C	**14**	B	**15**	A	**16**	C	**17**	A	**18**	A
19	B	**20**	B	**21**	A	**22**	B	**23**	B	**24**	D
25	B	**26**	D	**27**	D	**28**	B	**29**	C	**30**	C
31	B	**32**	C	**33**	C	34	B	35	A	36	B
37	A	**38**	B	**39**	B	40	A				

13.2 TYPES OF JOINTS

1	A	**2**	C	**3**	D	**4**	B	**5**	C	**6**	D	**7**	C
8	B	**9**	C	**10**	B	**11**	B						

13.3 MUSCLES AND MOVEMENT

1	B	**2**	C	**3**	D	**4**	A	**5**	A	**6**	B	**7**	B

13.4 DISORDERS OF SKELETAL SYSTEM

1	C	**2**	A	**3**	B	**4**	C	**5**	B

REVIEW QUESTIONS

MULTIPLE CHOICE QUESTIONS

1. Find the ball-and-socket joint. (U.B)
(a) Joint in the finger bones (b) Joint of neck and skull bones
(c) Joint at elbow (d) Joint at pelvic girdle and leg bones

2. All these are the parts of axial skeleton of humans except: (K.B)
(a) Ribs (b) Sternum
(c) Shoulder girdle (d) Vertebral column

3. The disorders in which there is an accumulation of uric acid in joints: (K.B)
(a) Gout (b) Rheumatoid arthritis
(c) Osteoporosis (d) Osteo-arthritis

4. What is correct about tendons? (U.B)
(a) Tendons are flexible and they join muscles with bones
(b) Tendons are non-elastic and they join bones with bones
(c) Tendons are non-elastic and they join muscles with bones
(d) Tendons are flexible and they join muscles with muscles

5. How many bones make our skull? (K.B)
(a) 14 (b) 22
(c) 24 (d) 26

6. What are the main components of a bone? (K.B)
(a) Marrow, spongy bone, wax (b) Marrow, compact bone, wax
(c) Compact bone and marrow (d) Compact bone, spongy bone, marrow

7. What do some bones produce? (K.B)
(a) Mucous (b) Hormones
(c) Oxygen (d) Blood cells

8. How would you define skeletal system? (U.B)
(a) All the bones in body
(b) All the muscles and tendons
(c) All the body's organs, both soft and hard tissues
(d) All the bones in body and the tissues that connect them

9. Find the incorrect statement. (U.B)
(a) Bone is where 'most blood cells are made
(b) Bone serves as a storehouse for various minerals
(c) Bone is a dry and non-living supporting structure
(d) Bone protects and supports the body and its organs

10. The purpose of rib cage is to: (A.B)
(a) Protect the stomach (b) Protect the spinal cord
(c) Protect the heart and lungs (d) Provide an object to which the lungs can attach

ANSWER'S KEY

1	**d**	**2**	**a**	**3**	**a**	**4**	**c**	**5**	**b**
6	**d**	**7**	**d**	**8**	**d**	**9**	**c**	**10**	**c**

SHORT QUESTIONS

1. Differentiate between cartilage and bone (K.B)

Ans: **DIFFERENTIATION**

The differences between cartilage and bone are as follows.

Cartilage	Bone
• Cartilage is a dense, clear, blue-white firm connective tissue.	• Bone is the hardest connective tissue in the body.
• Cartilage is less strong than bone.	• Bone is stronger than cartilage.
• The cells of cartilage are called chondrocytes.	• Bone contains different types of cells. The mature bone cells are called osteocytes.
• Hyaline Cartilage • Elastic Cartilage • Fibrous Cartilage	• Compact Bone • Spongy Bone

2. What is the role of skeleton in support and movement? (A.B)

Ans: **ROLE OF SKELETAL SYSTEM**

The role of the skeletal system are:

Protection:

Skeleton provides the protection to many internal organs, for example:

- Skull protects brain
- Vertebral column protects spinal cord.
- Ribs protect most of the internal organs.

Support:

Vertebral column provides the main support to the body mass.

Movement:

In our body skeleton works very closely with the muscular system to help or move.

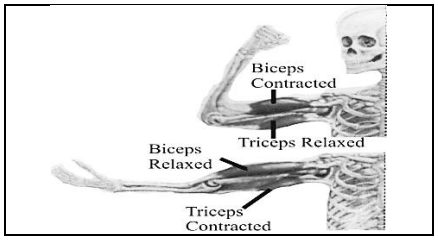
3. How would you differentiate between osteoporosis and arthritis? (K.B)

Ans: **DIFFERENTIATION**

The differences between osteoporosis and arthritis are as follows:

Osteoporosis	Arthritis
Definition	
• "Osteoporosis is the bone disease in adults, especially in old people. It is more common in old women".	• Arthritis means "inflammation in joints". It is very common in old age and in women.
Effects/Symptoms	
• In osteoporosis, there is a decrease in the density of bones due to the loss of calcium and phosphorus.	• It is characterized by pain and stiffness in joints (particularly in the weight bearing joints e.g. hip joint, ankle joint etc.).

4. Label the biceps and triceps in the following diagrams and also mention their contracted or relaxed states. (U.B)



UNDERSTANDING THE CONCEPT

Q.1 What are the main components of the axial skeleton and the appendicular skeleton of human? (K.B)

Ans: See L.Q 4 (Topic 13.1)

Q.2 Describe the types of joints and give examples (K.B)

Ans: See L.Q 1 (Topic 13.2)

Q.3 What are ligaments and tendons? What function do they perform? (A.B)

Ans: See L.Q 2 (Topic 13.2)

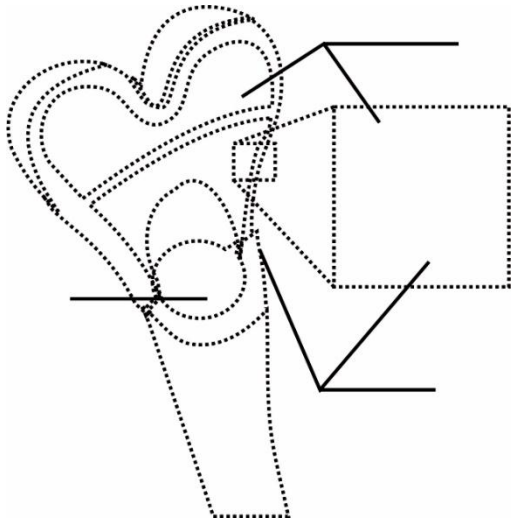
Q.4 Explain antagonism in muscle action selecting biceps and triceps as example. (A.B)

Ans: See L.Q 1 (Topic 13.3)

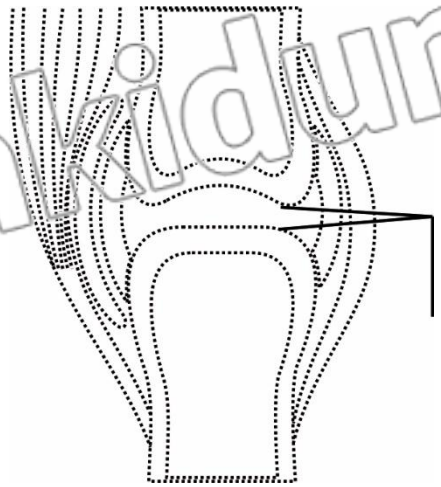
ASSIGNMENT

PRACTICE DIAGRAM & LABEL

COMPACT AND SPONGY BONE



HYALINE CARTILAGE



SELF TEST

Time: 40 min **Marks: 25**

Q.1 Four possible answers A, B, C and D to each question are given, mark the correct answer. **(6×1=6)**

1. The movement of an animal as a whole from one place to another:

(A) Coordination **(B)** Reproduction

(C) Locomotion **(D)** Respiration

2. Skeleton of arthropods:

(A) Hydrostatic **(B)** Exoskeleton

(C) Endoskeleton **(D)** Axial

3. Which prevent dislocation of joints?

(A) Cartilage **(B)** Tendons

(C) Ligaments **(D)** Bones

4. _____ are tough bands and attach muscles to bones.

(A) Ligament **(B)** Tendon

(C) Origin **(D)** Insertion

5. The end of muscle attached with movable bone:

(A) Extension **(B)** Flexion

(C) Insertion **(D)** Origin

6. It involves the inflammation of the membranes at joints:

(A) Osteoporosis **(B)** Gout

(C) Rheumatoid arthritis **(D)** Osteo-arthritis

Q.2 Give short answers to following questions. **(5×2=10)**

(i) What is difference between endoskeleton and exoskeleton?

(ii) What are difference between bones & cartilage?

(iii) What do you know about the movement of neck joint?

(iv) What are flexor and extensor?

(v) Define arthritis its treatment and symptoms.

Q.3 Answer the following questions in detail. **(5+4=9)**

a. Define Joint. Describe its types.

b. Describe different types of cartilage.

NOTE: Parents or guardians can conduct this test in their supervision in order to check the skill of the students.