For BioResire students

NEET Biology Material

Elite Batch

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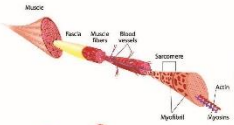
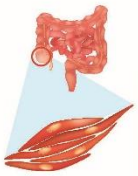
LOCOMOTION AND MOVEMENT

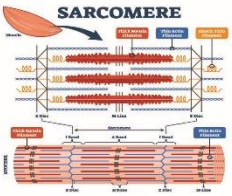


SKELETAL (Striated) MUSCLES
Attached to skeleton
Striation present



Visceral (Non – Striated) MUSCLES
In visceral organs, striation absent, involuntary, poor blood supply.

Cardiac MUSCLES
In heart wall, striations present, involuntary, rich blood supply.

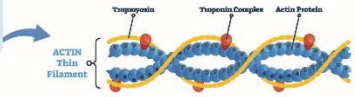


Structure of Skeletal MUSCLE

MUSCLES

Myosin filament
Polymer of many monomeric protein called meromyosins.

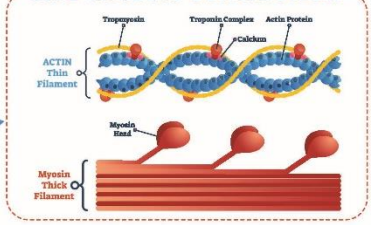
Actin filaments
Made up of 2 filamentous (F) actins. Each F-actin is a polymer of globular (G) actins



Structure of Contractile Proteins

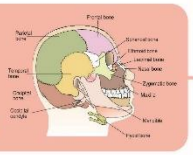
Mechanism of MUSCLE Contraction

ATP Muscle Contraction

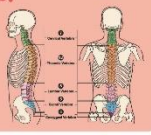


AXIAL SKELETON

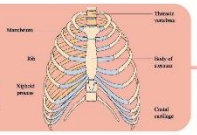
Skull (29)
Cranial Bones (8)
Facial Bones (14)
Hyoid Bones (1)
Ear Ossicles (3 × 2 = 6)



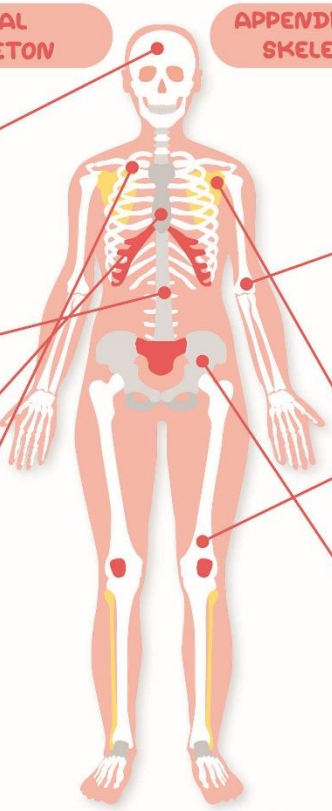
Vertebral Column (26)
Cervical (7)
Thoracic (12)
Lumbar (5)
Sacral (1 - fused)
Coccygeal (1 – fused)



Sternum or Breast Bone (1)
Flat bone on the ventral midline of thorax



Ribs (12 Pairs)
True Ribs (First 7 pairs)
Vertebrochondral (False) Ribs (8th , 9th and 10th pairs)
Floating Ribs (11th and 12th pairs)



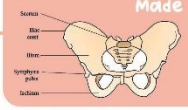
APPENDICULAR SKELETON

Bones of fore – Limbs (60)
Humerus (1)
Radius (1)
Ulna (1)
Carpals (8)
Metacarpals (5)
Phalanges (14)

Bones of Hind – Limbs (60)
Femur (1)
Patella (1)
Tibia (1)
Fibula (1)
Tarsals (7)
Metatarsals (5)
Phalanges (14)

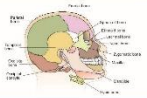
Pectoral Girdle (4)
Clavicle (2)
Scapula (2)

Pelvic Girdle (2)
Made up of two coxal bones. (Coxal)
Ilium
Ischium
Pubis

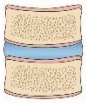


JOINTS

Fibrous Joints
Do not allow movement
Example: Joints between teeth and maxilla

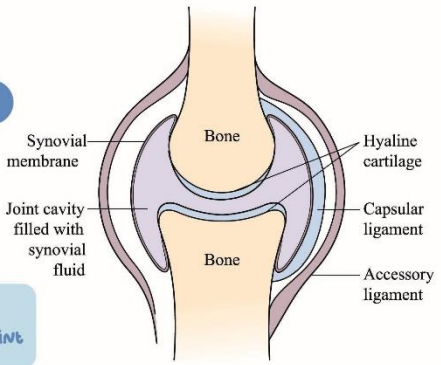


Cartilaginous Joints
Little Movement
Example: Joints between inter-vertebral disc



Synovial Joints
Movements and locomotion.

TYPES
- Ball and Socket Joint
- Hinge Joint
- Pivot Joint
- Gliding Joint
- Saddle Joint



	Myasthenia Gravis	Muscular Dystrophy	Tetany	Arthritis	Osteoporosis	Gout
Cause	Auto immune disorder	Genetic disorder, hereditary	Low level of Ca^{2+} ions	Inflammation of joints	Age related disorders	Accumulation of uric acid crystals
Affect	Neuromuscular junction	Degenerate skeletal muscle	Involuntary contraction of muscles	Joints	Bones	Inflammation in joints
Symptoms	Fatigue, weakening, and paralysis of skeletal muscle	Weak and loss of muscle mass	Muscle cramps, spasms or tremors	Pain, redness, stiffness, swelling tenderness and warmth	Decrease bone mass and estrogen	Joint pain, limited range of motion and redness

LOCOMOTION AND MOVEMENT

Locomotion and Movement

Movement is defined as the movement of living organisms from one place to another; if the movement causes a change in location or position, it is called locomotion; such as walking, climbing, running, etc.

Kinds of Movement

There are three kinds of movement which are ciliary, amoeboid, and muscular.

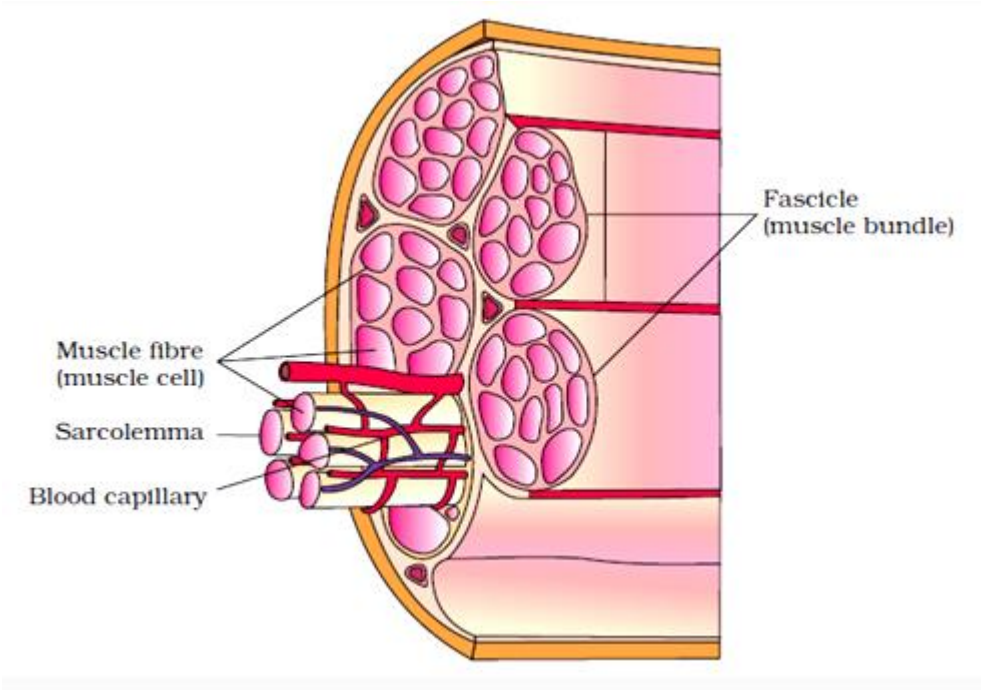
- **Ciliary Movement:** This type of movement occurs in those organs which are covered with ciliated epithelium. It helps to capture dust particles that are inhaled during breathing and also helps to move the egg from the fallopian tube into the uterus.
- **Amoeboid Movement:** This type of movement can be seen in some immune cells, such as macrophages and white blood cells. It can also be seen in amoeba moving through pseudopods.
- **Muscular Movement:** Muscle movement is seen in the tongue, chin, limbs, etc. The muscles, bones, and nervous system are all involved in locomotion.

Muscles

Muscles are specialized tissues of mesodermal origin. They have property like excitability, contractility, extensibility and elasticity.

There are three types of muscles:

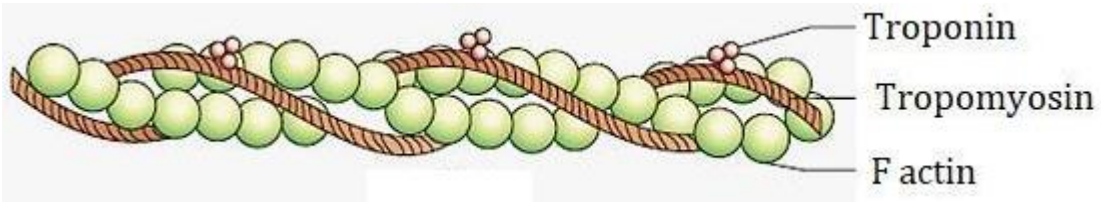
- **Skeletal muscle:** These are closely associated with the skeletal components of the body having a striped appearance when viewed under a microscope hence known as striated muscles. Primarily, these muscles are involved in the locomotory actions and the changes of the body posture.
- **Visceral muscle:** These are situated in the inner walls of the hollow visceral structures of the body such as the reproductive tract, alimentary canal etc and show no striations. As they appear smooth, they are referred to as smooth muscles. These involuntary muscles enable the transportation of food through the digestive tract and the movement of gametes through the genital tract.
- **Cardiac muscle:** These are the muscles of the heart, where the cells arrange in a branching pattern forming cardiac muscles. These are striated and involuntary in nature.
- **Fascia:** Skeletal Muscle is made up of muscles bundles (fascicles), held together by collagenous connective tissue called fascia.



- Each muscle bundle contains a number of muscle fibres. Each muscle fibre is lined by plasma membrane called sarcolemma enclosing sarcoplasm. Partially arranged myofibrils are present in muscle bundle having alternate light and dark bands due to presence of protein- actin and myosin
- Light bands contain actin and is called I-band (isotropic band) and dark band contains myosin, called A-band (anisotropic band). Both bands are present parallel to each other in longitudinal fashion.
- In center of each I-band is elastic fiber called 'Z' line. In the middle of A-band is thin fibrous 'M' line. The portion of myofibrils between two successive 'Z' lines is the functional unit of contraction called a sarcomere.
- At resting stage thin filament overlaps the thick filament. The part of thick filament not overlapped is called 'H' Zone.

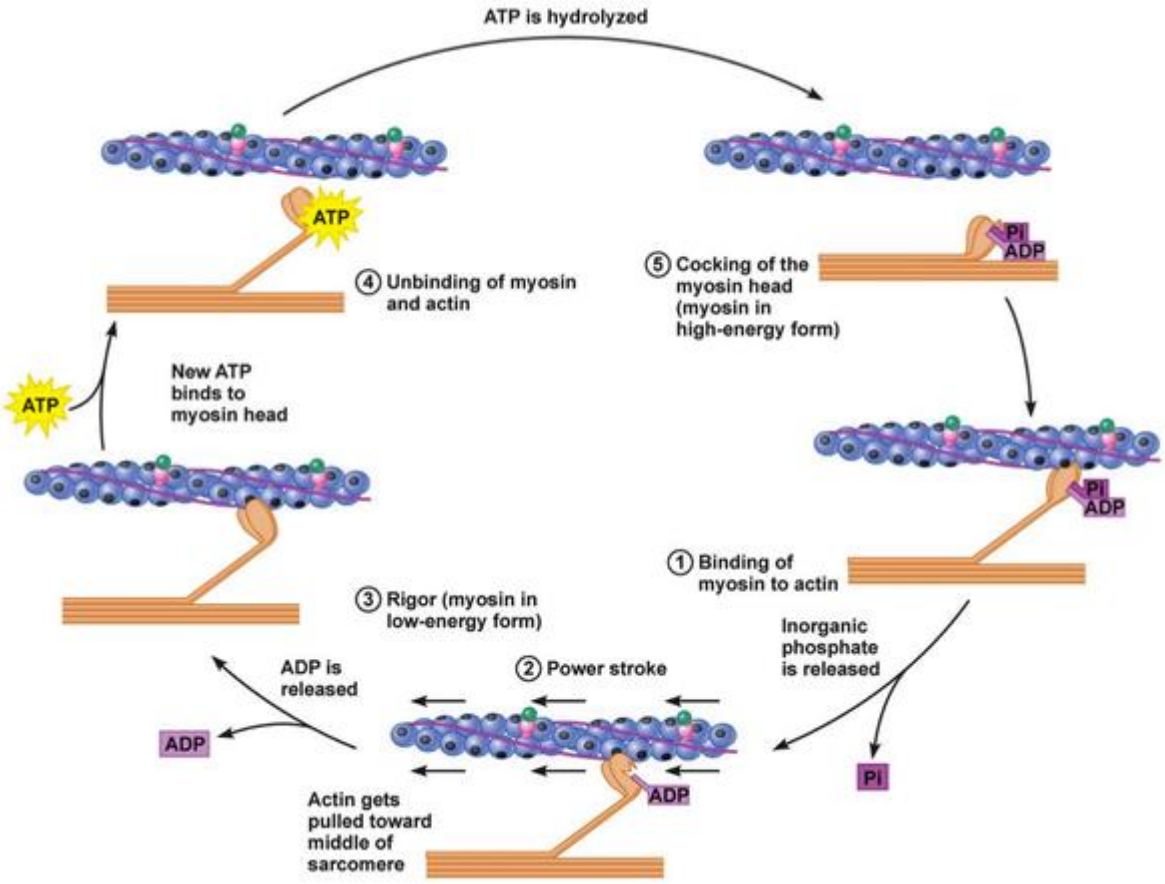
Structure of contractile Protein

- Each thin filament (actin) is made of two 'F' actins helically wounded to each other. Two filaments of another protein, tropomyosin runs close to it. A complex protein Troponin is distributed at regular intervals on the tropomyosin.
- Each myosin filament is made of many monomeric proteins called Meromyosins. Each meromyosin has globular head with short arm and tails. Globular head has ATP binding sites.



Mechanism of muscle contraction

- The mechanism of muscle contraction is explained by sliding mechanism theory in which thin filament slide over thick filament.
- Muscle contraction start with signal sent by CNS via motor neuron. Neural signal release neurotransmitter (Acetyl choline) to generate action potential in the sarcolemma.
- This causes the release of Ca^{++} from sarcoplasmic reticulum.
- Ca^{++} activates actin which binds to the myosin head to form a cross bridge.
- These cross bridges pull the actin filaments causing them to slide over the myosin filaments and thereby causing contraction.
- Ca^{++} are then returned to sarcoplasmic reticulum which inactivate the actin. Cross bridges are broken, and the muscles relax.



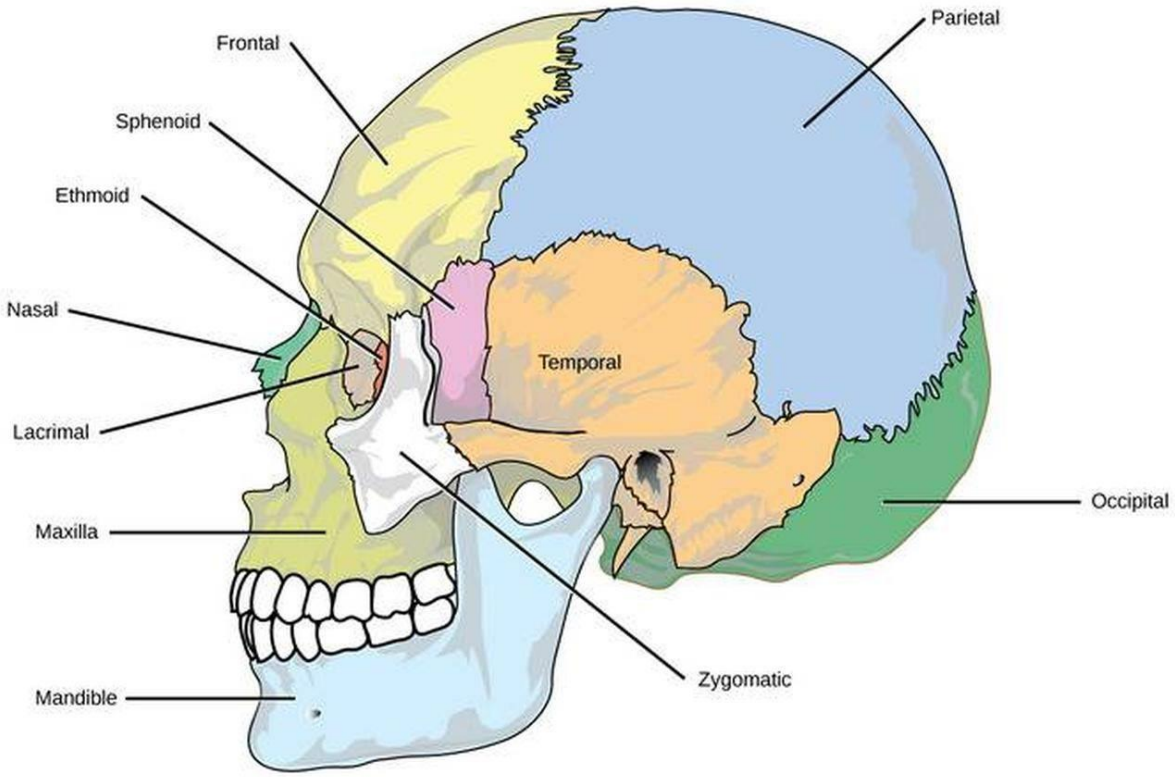
Muscles are classified as

- **Red fibres:** Red fibres (aerobic muscles-) contain myoglobin that has plenty of mitochondria to use large amount of oxygen stored in them.
- **White fibres:** White fibres the muscle fibres containing less number of myoglobin are called white fibres.

Skeletal System

- Framework of bones and cartilage forms the skeletal system. In human beings, it consists of 206 bones and some cartilages.
- The two principle division of skeletal system are:
- Axial Skeleton (80 bones) includes skull, vertebral column, sternum and ribs

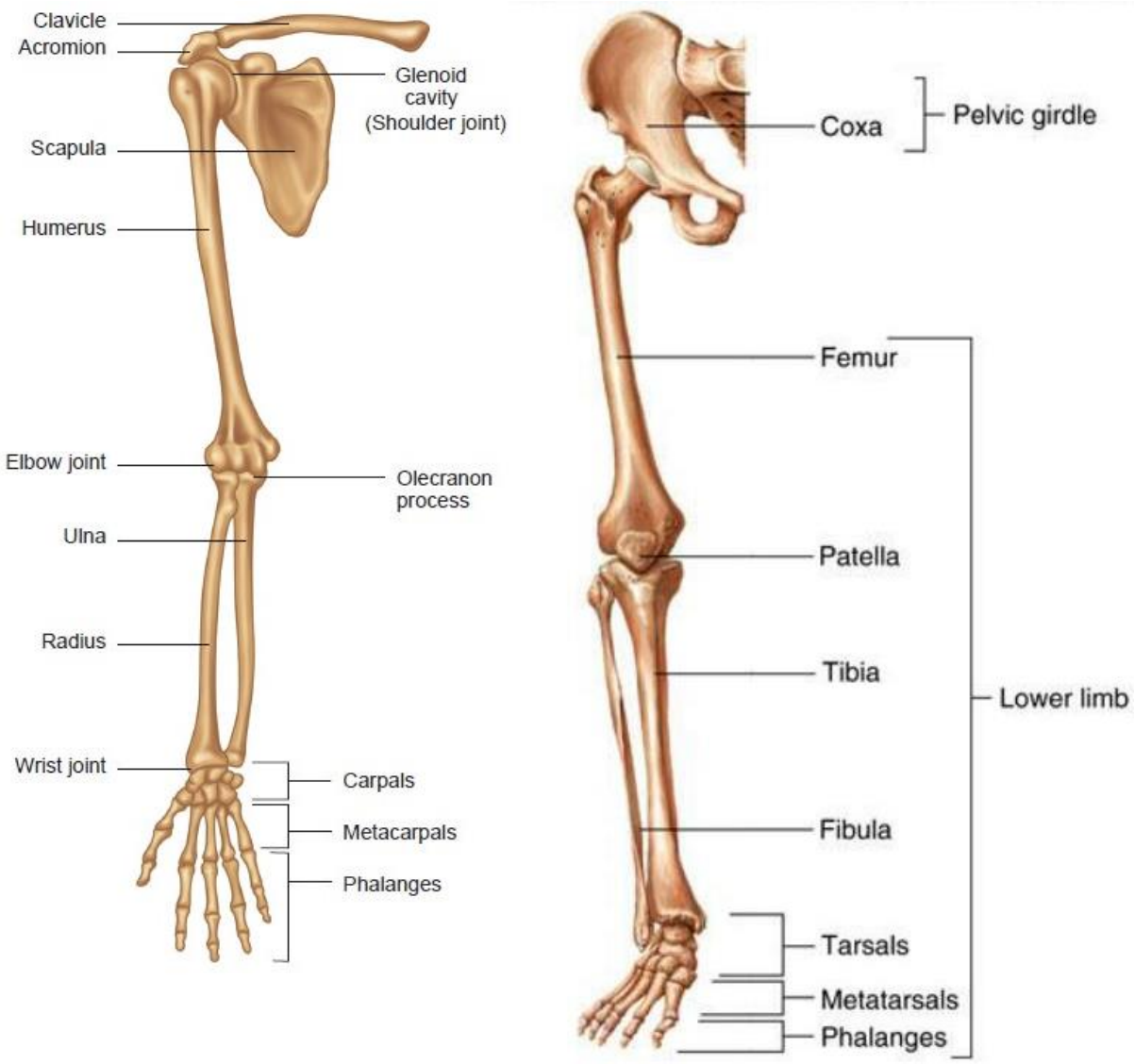
constitute axial system.



- The skull (22 bones) is composed of cranial and facial bones. Cranial (8 bones) forms protective covering for brain (cranium). The facial region consists of 14 skeletal systems that form front part of skull. Hyoid bone (U-shaped) forms the base of buccal cavity.
- The middle ear bone (Malleus, Incus and Stapes) collectively called Ear Ossicles. Skull joins with vertebral column with two occipital condyle.
- Vertebral column consists of 26 serially arranged vertebrae. First vertebra is atlas that combines with occipital condyle. Other includes Cervical -7, thoracic -12, lumbar -5, sacral -1 coccoygeal -1.
- 12 pairs of ribs connected dorsally to vertebral column and ventrally to sternum. 11th and 12th rib bones are not connected with sternum and are called floating ribs.

Appendicular Skeleton

Appendicular Skeleton includes bones of limbs and girdles. Each limb contains 30 bones.



- **Upper Arm:** Humerus, radius and ulna, 8-carpels, 5-metacarpels, 14-phalanges,
- **Lower Limb:** Femur, tibia and fibula, 7-tarsals, 5-metatarsals, 14-phalanges, cup shaped patella cover the knee.
- **Pectoral and Pelvic girdle bones:** Pectoral and Pelvic girdle bones help in the articulation of the upper and the lower limbs respectively with the axial skeleton. Pectoral girdle consists of a clavicle and a scapula. Pelvic girdle consists of two coxal bones. Each coxal bone is formed by the fusion of three bones – ilium, ischium and pubis.
- **Joints:** Are points of contact between bones, or between bones and cartilage.
- **Fibrous joints:** Do not allow any movements. Present in flat skull bones to form cranium.
- **Cartilaginous joints:** Bones are held together with the help of cartilage present in vertebrae. Permits limited movements.
- **Synovial joints:** Fluid filled synovial cavity, provide considerable movements. Ball and socket joint, hinge joints, pivot joints, gliding joints etc.

Disorders of Muscular and Skeletal System

- **Myasthenia gravis:** Auto immune disorder affecting neuromuscular junction causing fatigue, weakening and paralysis of skeletal system.
- **Muscular Dystrophy:** Degeneration of skeletal muscles due to genetic disorder.
- **Osteoporosis:** Decreased bone mass in old age leading to chance of fracture due to decreased estrogen.
- **Arthritis:** inflammation of joints.
- **Gout:** inflammation of joints due to accumulation of uric acid crystals.
- **Tetany:** Rapid spasms in muscle due to low Ca^{++} in body fluid.

NCERT LINE BY LINE QUESTIONS

Para-20.1

Introduction and Type of Movement

1. Streaming of cytoplasm/cyclosis is seen in **[Pg-302,E]**

(A) Amoeba (B) Macrophages (C) Leukocytes (D) All

2. Which of the following statements is correct? **[Pg-303,E]**

(A) Cytoplasmic streaming helps in pseudopodia formation or amoeboid movement

(B) Cytoplasmic streaming is caused by contracting microfilament

(C) Both a and b

(D) Locomotion is not a voluntary movement

3. I. *Paramecium* employs cilia for pushing food in cytopharynx and in locomotion

II. Hydra takes help of tentacles for both food capturing and locomotion

III. All locomotion's are movements and vice-versa

IV. Methods of locomotion vary with habitats and the demands of situation

V. Ciliated epithelium is found in respiratory tract, renal tubules and reproductive tracts

Which of the above statements is false? **[Pg-302,303,E]**

(A) I and III (B) III (C) III and V (D) IV and V

Para-20.2 Muscle

4. Which of the following statements is false? **[Pg-303,E]**

(A) Locomotion and many other movements required coordinated muscular activities

(B) Muscle is a specialised tissues of endodermal in origin

(C) There are about 639 muscles which contribute about 40 - 50 % of adult body weight

(D) Muscles show contractibility, excitability and flexibility

5. Which of the following statements about the skeletal muscles is correct?

(A) They are striated muscles

(B) They are voluntary muscles

(C) They are primarily involved in locomotory actions

(D) All

6. Which of the following statements about visceral muscles is correct? **[Pg-303,E]**

(A) They are non-striated muscles (smooth muscles)

(B) They are involuntary muscles

(C) They have various functions

(D) All

7. Cardiac/heart muscles are -**[Pg-304,E]**

(A) Striated and involuntary (B) Not fatigued

(C) Branched (D) All

8. Which of the following statements is false? **[Pg-303,304E]**

(A) Smooth muscles are found in urinary bladder, alimentary canal and genitaltract

(B) A striated muscle is syncytium (multinucleate)

(C) The cytoplasm of striated muscle is called endoplasm

(D) The plasma membrane and ER ofstriated muscles are called sarcolemma and sarcoplasmic reticulum respectively

9. The source of Ca+2 for the muscle is –**[Pg-304,E]**

(A) T-tubule (B) Sarcosome

(C) Sarcolemma (D) Sarcoplasmic reticulum

10. The fascia surrounding a muscle is madeup of - **[Pg-304,E]**

(A) Cartilage (B) Collagenous connective tissues

(C)Adipose tissue (D) Blood vessels

11. Contractile fibrils of muscles are called –**[Pg-304,E]**

(A) Neurofibrils (B) Collagen fibres

(C) Myofibrils (D) Yellow fibres

12. Myofibrils show alternate dark and lightbands in - **[Pg-304,E]**

(A) Cardiac muscles (B) Smooth muscles

(C) Striped muscles (D) a and c

13. Select the true statement(s) - **[Pg-305,E]**

(A) A-band is present in the middle ofsarcomere

(B) H-zone is present in the middle of Aband

(C) M-line is present in the middle of Hzone

(D) All of the above

14. Which is the smallest one? **[Pg-304,E]**

(A) Muscle fibre (B) Myofibril

(C) Actin (D) Sarcomere

Para-20.2.1

Structure of Contractile Proteins

15. Match Column I with Column II –**[Pg-304,305,M]**

	Column I		**Column II**
A.	Structural and functional unit of a myofibril	I.	H-zone
B.	Protein of thin filament	II.	Myosin
C.	Protein of thick filament	III.	Sarcomere
D.	The central part of thick filament not overlapped by thin filament	IV.	Actin

(A) A-I, B-II, C-III, D-IV

(B) A-I, B-III, C-II, D-IV

(C) A- I, B - IV, C - III, D - II

(D) A- III, B - IV, C - II, D – I

16. Z-line divides the myofibrils into –**[Pg-305,E]**

(A) Sarcomere (B) Sarcolemma

(C) Sarcosome (D) Microtubules

17. Sarcomere is the area between –**[Pg-305,E]**

(A) 2 H-zones (B) 2 Z-lines

(C) 2 M-lines (D) 2A-bands

18. Light bands (thin filaments) contain actin and are called - **[Pg-304,E]**

(A) A-bands or Isotropic band

(B) A-bands or Anisotropic bands

(C) I-bands or Isotropic bands

(D) I-bands or Anisotropic bands

19. Dark bands (thick filaments) contain myosin and are called - **[Pg-304,E]**

(A) A-bands or Isotropic band

(B) A-bands or Anisotropic bands

(C) I-bands or Isotropic bands

(D) I-bands or Anisotropic bands

20. Which of the following statements about the striated muscles is false? **[Pg-305,M]**

I. In the centre of each I-band is an elastic fibre (Z-line) which bisects it

II. Thin filaments are firmly attached to the Z-line

III. M-line is a fibrous membrane in the middle of A-bands

IV. A sarcomere comprises one full A-bands and 2 half I-bands

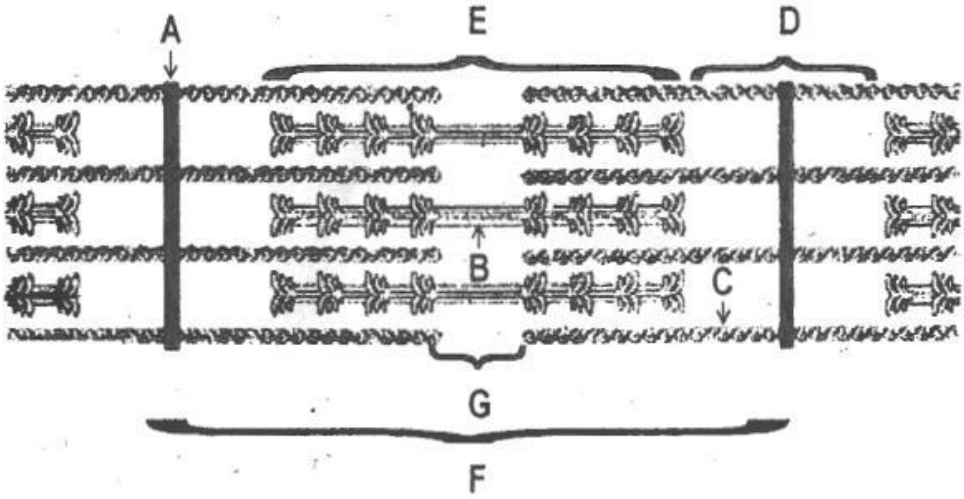
(A) All (B) IV (C) I and II (D) None

21. The region between the ends of the A-bands of 2-adjoining sarcomeres is called

[Pg-305,E]

(A) The Z-band (B) The H-zone (C) The T-tubule (D) The I-band

22. Choose the letter from the figure that most appropriately corresponds to the structure – **[Pg-305,E]**



I. A-band II. I-band III. Sarcomere IV. H-zone V. Myosin

VI. Actin, Troponin, Tropomyosin VII. Z- line

(A) I - E, II - D, III - F, IV - G, V - B, VI -C, VII -A

(B) I - E, II - D, III - C, IV - G, V - B, VI -A, VII - F,

(C) I - E, II - D, III - F, IV - G, V - C, VI -A, VII - B

(D) I - E, II - D, III - F, IV -A, V - B, VI - C,VII – G

23. An individual sarcomere consist of- **[Pg-305,E]**

(A) A stack of actin fibres

(B) A stack of myosin units

(C) Overlapping actin and myosin

(D) Overlapping myosin arid membrane

24. Which of the following statements about the molecular arrangement of actin and myosin in myofibrils is false? **[Pg-306,M]**

I. Each actin (thin filament) is made of 2F (filamentous) actins.

II. F-actin is the polymer of G (globular) actin.

III. 2F- actins are twisted into a helix

IV. Two strands of tropomyosin (protein) lie in the grooves of F-actin

V. Troponin molecules (complex proteins) are distributed at regular intervals on the tropomyosin

VI. Troponin forms the head of the myosin molecule

VII. The myosin is a polymerised protein

(a) I, II, III (B) Only VII (C) Only VI (D) Only III

25. One myosin filament in the myofibril of skeletal muscle fibres is surrounded by how many actin filaments - **[Pg-306,E]**

(A) 8 (B) 2 (C) 6 (D) 4

26. The cross bridges of the sarcomere in skeletal muscle are made up of – **[Pg-306,E]**

(A) Actin (B) Myosin (C) Troponin (D) Myelin

27. The functions of tropomyosin in skeletal muscle include - **[Pg-306,E]**

(A) Sliding on actin to produce shortening.

(B) Release Ca+2 after initiation of contraction

(C) Acting as "relaxing protein" at rest by covering up the sites where myosin binds to actin

(D) Generates ATP

28. Tropomyosin is moved by which of following proteins - **[Pg-306,E]**

(A) Calmodulin (B) Actin (C) Troponin (D)Acetylcholine

29. Ca+2 bind _____ in the skeletal muscles and leads to exposure of the binding site for _____ on the filament _____. **[Pg-306,E]**

(A) Troponin, myosin, actin

(B) Troponin, actin, relaxin

(C) Actin, myosin, troponin

(D) Tropomyosin, myosin, actin

30. Following is the figure of actin (thin) filaments. Identify A, Band C. **[Pg-306,E]**

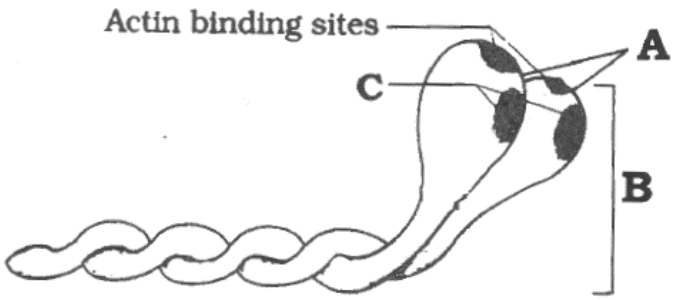
(A) A- Tropomyosin, B - Troponin, C - Factin

(B) A- Troponin, B - Tropomyosin, C -Myosin

(C) A- Troponin, B - Myosin, C -Tropomyosin

(D) A- Troponin, B - Tropomyosin, C - Factin

31.



[Pg-306,E]

The above figure is related with myosin monomer (meromyosin). Identify A to C -

(A) A- head, B - cross arm, C – GTP binding sites

(B) A- head, B - cross arm, C - Ca+2 binding sites

(C) A- head, B - cross arm, C –ATP binding sites

(D) A- cross arm, B - head, C –ATP binding sites

32. Which of the following statements is false? **[Pg-306,M]**

(A) Each myosin is a polymerised protein

(B) Many meromyosin constitute one thick filament (myosin)

(C) Each meromyosin's tail is called heavy meromyosin (HMM) and head is called light meromyosin (LMM)

(D) The globular head is an active ATPase enzyme and has binding sites for ATP

and active sites for actin

Para-20.2.2

Mechanism of Muscle Contraction

33. The action potential that triggers a muscle contraction travels deep within the muscle cell by means of _____.**[Pg-307,E]**

(A) Sarcoplasmic reticulum (B) Transverse tubules

(C) Synapse (D) Motor end plates

34. ATP provides energy for muscle contraction by allowing for- **[Pg-307,E]**

(A) An action potential formation in the muscle cell

(B) Cross-bridge detachment of myosin from actin

(C) Cross-bridge attachment of myosin to actin

(D) Release of ca+2 from sarcoplasmic reticulum

35. A motor unit is best described as – **[Pg-307,E]**

(A) All the nerve fibres and muscle fibres in a single muscle bundle

(B) One muscle fibre and its single nerve fibre

(C) A single motor neuron and all the muscle fibres that it innervates

(D) It is the neuron which carries the message from muscle to CNS

36. Motor end plate is a - **[Pg-307,E]**

(A) Neuromuscular junction (B) Dendron of motor neuron

(C) Plate of motor neuron (D) Gradient of proton motive force

37. Electrical excitation in a muscle fibre most directly causes - **[Pg-307,E]**

(A) Movement of tropomyosin

(B) Attachment of the cross bridges to actin

(C) Release of Ca+2 from sarcoplasmic reticulum

(D) Splitting of ATP

38. The energy for muscle contraction is most directly obtained from - **[Pg-307,E]**

(A) Phosphocreatine (B) ATP

(C) Anaerobic respiration (D) Aerobic respiration

39. According to the sliding filament theory –**[Pg-306,E]**

(A) Actin (thin filament) moves past myosin (thick filament)

(B) Myosin moves past actin

(C) Both myosin and actin move past each other

(D) None of these is correct

40. Put the following phrases in proper order to describe what occurs at the neuromuscular junction to trigger muscle contraction. **[Pg-307,M]**

I. Receptor sites on sarcolemma.

II. Nerve impulse.

III. Release of Ca+2 from sarcoplasmic reticulum

IV. The neurotransmitter acetylcholine is released

V. Sarcomere shorten

VI. Synaptic cleft

VII. Spread of impulses over

sarcolemma on T-tubules

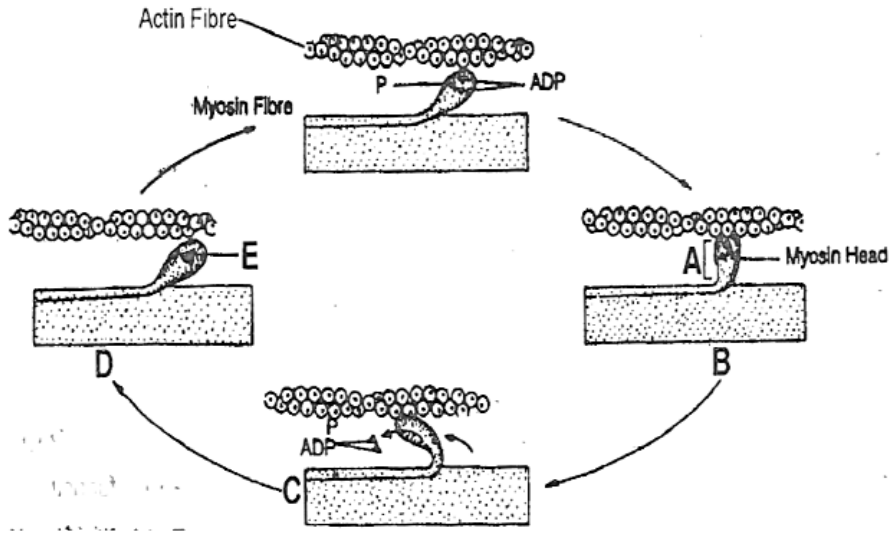
(A) II, IV, I, VI, VII, III, V

(B) II, IV, VI, I, VII, III, V

(C) I, II, III, IV, V, VI, VII

(D) VII, VI, V, IV, III, II, I

41. Go through the following diagram describing muscle contraction. **[Pg-307,E]**



Now identify A to E.

(A) A- Cross bridge, B - Cross bridgeformation, C-Breaking of cross bridge, D –Sliding (rotation), E -ATP

(B) A- Cross bridge, B - Cross bridge formation, C – Sliding/rotation, D –Breaking of cross bridge, E -ATP

(C) A- Cross bridge, B - Breaking of Cross bridge, C – Sliding/rotation, D - Cross

bridge formation, E -AMP

(D) A- Cross bridge, B - Cross bridgeformation, C – Sliding/rotation, D - ADP, E - Breaking of cross bridge

42. How does the troponin-tropomyosin complex affect cross-bridge cycling?**[Pg-307,E]**

(A) When [Ca2+] is low, the troponintropomyosin complex blocks actin's binding site for myosin. When [Ca2+]is high, the complex rolls out of the way, allowing myosin to bind to actin and initiate the cross-bridge cycle.

(B) The troponin-tropomyosin complex regenerates ATP for the myosin ATPase.

(C) The troponin-tropomyosin complex regulates calcium release from the terminal cisternae.

(D) The troponin-tropomyosin complex binds to the myosin head, facilitating contact with the actin filaments

43. Relaxation of muscle is due to – **[Pg-307,E]**

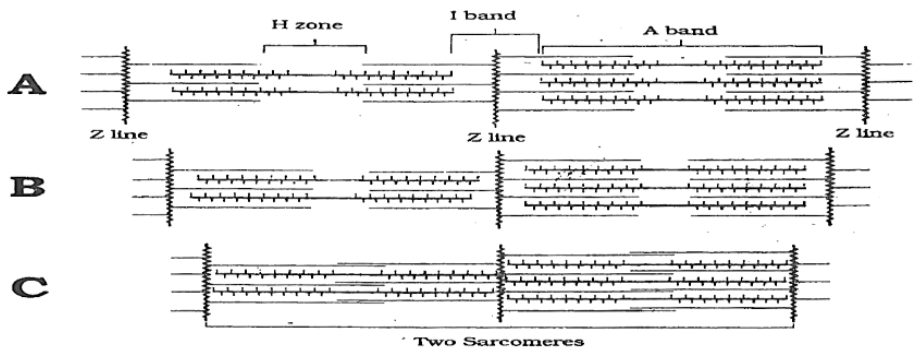
(A) Pumping of Ca+2 into sarcoplasmic cisternae

(B) Presence of ATP

(C) Conformational change in troponin and masking of actin filaments

(D) A and C

44.



[Pg-308,E]

The diagrams given above show 3 different condition of sarcomeres.

Identify these conditions -

(A) A– contracting, B - relaxed, C –maximally contracted

(B) A – relaxed, B - contracting, C –maximally contracted

(C) A- maximally contracted, B –contracting, C - relaxed

(D) A- relaxed, B - maximally contracted,C–contracting

45. When a skeletal muscle shortens during contraction which of these statements is false? **[Pg-307,E]**

(A) The I-band shortens

(B) The A-band shortens

(C) The H-zone becomes narrow

(D) The sarcomeres shorten

46. The muscle band that remains unchanged during muscle contraction and relaxation of the skeletal muscle is –**[Pg-308,E]**

(A) I (B)A (C) H (D) Z line

47. Which of the following statements is correct? **[Pg-307,E]**

(A) During muscle contraction chemical energy changes into mechanical energy

(B) Muscle fatigue is due to lactic acid formation due to anaerobic respiration

(C) The reaction time of the fibres can vary in different muscles

(D) All

48. The compound or pigment acting as an oxygen store in skeletal muscles is –

[Pg-308,E]

(A) Myoglobin (B) Haemoglobin

(C) Myokinase or ATP (D) Cytochrome

49. I. Number of mitochondria less.

II. Number of mitochondria more

III. Sarcoplasmic reticulum is abundant

IV. Myoglobin content high

V. Sarcoplasmic reticulum moderate

VI. Aerobic muscles

VII. Depend on anaerobic respiration for energy

VIII. Less myoglobin content

A. Red muscles

B. White muscles

Identify above (I to VIII) traits as characteristic of A and B types of

muscles- **[Pg-307,308,M]**

(A) A- I, III, VII, VIII; B -II, IV, V, VI

(B) A-II, IV, V, VI; B-I, III, VII, VIII

(C) A-I, III, IV, VII; B – II, V, VI, VIII

(D) A- II, V, VI, VIII; B - I, III, IV, VII

Para-20.3

Skeletal System

50. Skeletal system consists of - **[Pg-309,E]**

(A) Only bones

(B) Only cartilage

(C) A framework of bones and a few cartilage

(D) A framework of cartilage. and a few bones

51. Bone has a very hard matrix due to presence of- **[Pg-309,E]**

(A) NaCl (B) Ca-salts (C) K-salts (D) Fe-salts

52. Cartilage has slightly pliable matrix due to - **[Pg-309,E]**

(A) Chondroitin salts (B) Osteoblast

(C) Chondroblasts (D) Osteoclast

53. How many bones make up the human skeleton? **[Pg-309,E]**

(A) 948 (B) 96 (C) 796 (D) 206

54. Number of bones in human axial skeleton is - **[Pg-309,E]**

(A) 80 (B) 106 (C) 206 (D) None

55. Match Column I with Column II – **[Pg-309,M]**

	Column I		**Column II (Number of bones)**
A.	Cranium/Brainbox	**I.**	29
B.	Skull (Cranial and facial bones)	**II.**	8
C.	Face	**III.**	14
D.	Hind limb	**IV.**	12 pairs
E.	Ribs	**V.**	30

(A) A-I, B-II, C-III, D-V, E-IV

(B) A- II, B - I, C - III, D - V, E - IV

(C) A - I, B - II, C- III, D - IV, E - V

(D) A- V, B - IV, C - III, D - II, A- I

56. Hyoid/Tongue bone is - **[Pg-309,E]**

(A) T-shaped (B) J-shaped (C) U-shaped (D) L-shaped

57. A normal human being has how many ear ossicle? **[Pg-309,E]**

(A) 3 (B) 6 (C) 9 (D) None

58. Which one of the following is not included under ear ossicles - **[Pg-309,E]**

(A) Malleus (B) Ileum (C) Incus (D) Stapes

59. Human Cranium has small protuberance(s) at the posterior end called _____ and ____ in number. **[Pg-309,310,E]**

that articulates with first vertebra (atlas vertebra)-

(A) occipital condyle, 6 (B) occipital condyle, 2

(C) occipital condyle, 4 (D) occipital condyle, 3

60. Human skull is - **[Pg-310,E]**

(A) Dicondylic (B) Monocondylic (C) Procoelous (D) Hetercoelous

61. Which of the following statements about human vertebral column is false?**[Pg-310,M]**

(A) Vertebral column consists of 26 vertebrae

(B) It is ventrally placed

(C) It extends from the base of skull and constitutes the main framework of the trunk

(D) Neural canal in vertebra is the passage for spinal cord

62. Human adult vertebral formula is- **[Pg-310,E]**

(A) C4 T8 L4 S8 C8 (B) C7 T8 L5 S6 C7

(C) C7 T12 L2 S1 C2 (D) C7 T12 L5 S1 C1

63. Which of the following vertebra in adult human are fused ones? **[Pg-310,E]**

(A) Thoracic and lumber (B) Thoracic and cervical

(C) Sacral and coccygeal (D) Cervical and coccygeal

64. Which of the following is not the function of vertebral column? **[Pg-310,M]**

(A) Protects spinal cord and supports the head

(B) Serves as the point of attachment for ribs and musculature of the back

(C) Both

(D) Supports Tarsals and Metacarpals

65. Which of the following is not correct about sternum? **[Pg-310,E]**

(A) It is commonly called breast bone

(B) It is flat bone

(C) It is 2 in number

(D) It is located on the ventral mid line of thorax

66. Each typical rib is a thin flat bone connected ____ to the vertebral column and _____ to the sternum- **[Pg-310,E]**

(A) Dorsally, ventrally (B) Ventrally, dorsally

(C) Dorsally, dorsally (D) Ventrally, Ventrally

67. Typical ribs are - **[Pg-310,E]**

(A) Monocephalic (B) Dicephalic

(C) Tricephalic (D) Tetracephalic

68. Match Column I with Column II – **[Pg-310,M]**

Column I	**Column II**
A. True ribs	**I.** 3 pairs
B. False ribs	**II.** 2 pairs
C. Floating ribs	**III.** 7 pairs

(A) A-I, B-II, C-III (B) A-III, B-I, C-II

(C) A- III, B - II, C – I (D) A-ll, B-l, C-III

69. Match Column I with Column II – **[Pg-310,M]**

Column I	**Column II**
A. False ribs	**I.** 1st to 7th pair
B. True ribs	**II.** 11th and 12th pair

C. Floating ribs **III.** 8th to 10th pair

D. Sternum **IV.** One

(A) A-I, B-II, C-III, D- IV

(B) A-IV, B-III, C-II, D- I

(C) A- I, B - III, C - II, D- IV

(D) A-III, B-I, C-II, D- IV

70. Identify the ribs - **[Pg-310,E]**

a. Ribs are attached to the sternum ventrally and to the vertebrae dorsally.

b. Ribs are attached to sternum through costal cartilage (hyaline) of 7th rib

c. Ribs are not attached to sternum

I. True ribs

II. False ribs

III. Floating ribs

(A) a-I, b-II, c-III (B) a-I, b-III, c-II

(C) a-II, b-I, c-III (D) a-III, b -II, c-I

71. Which of the following ribs are called vertebrochondral ribs? **[Pg-310,E]**

(A) True ribs (B) False ribs (C) GorIIIa ribs (D) Floating ribs

72. Rib cage is formed by all except – **[Pg-310,E]**

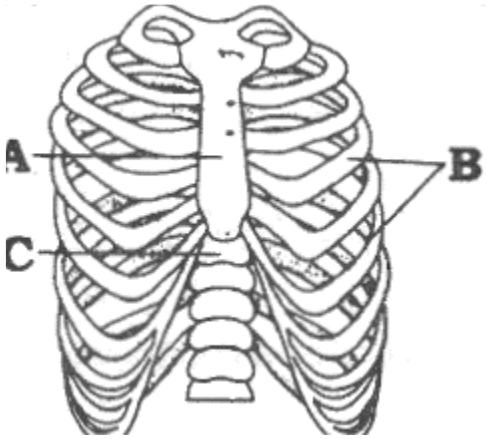
(A) Thoracic vertebrae (B) Lumbar vertebrae

(C) Ribs (D) Sternum

73. Each limb (upper or lower) consists of how many bones – **[Pg-310,E]**

(A) 30 (B) 60 (C) 101 (D) 8

74. The accompanied figure is rib cage.



Identify A, Band C respectively-

(A) Coccyx, ribs, vertebral column

(B) Sternum, ribs, vertebral column

(C) Scapula, ribs, vertebral column

(D) Tarsal, ribs, vertebral column

75. Number of bones in human appendicular skeleton is - **[Pg-310,E]**

(A) 80 (B) 120 (C) 126 (D) 206

76. Number of bone in each upper limb is – **[Pg-310,311,E]**

(A) 1, 1, 1 (B) 8, 5, 14

(C) 2, 2, 2, 16, 10, 28 (D) 1, 1, 1, 8, 5, 14

77. Phalangeal/digital formula for human hand/foot is- **[Pg-311,E]**

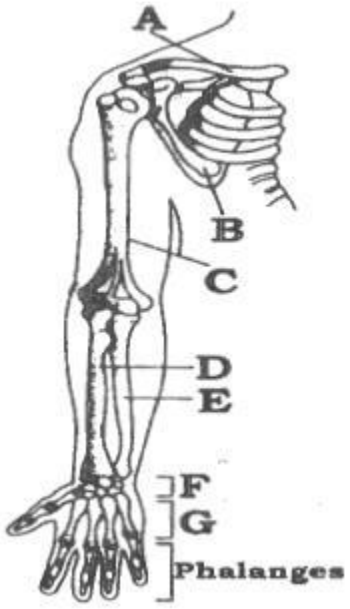
(A) 0, 2, 2, 3 (B) 0, 2, 3, 3 ,3

(C) 2, 2, 3, 3, 3 (D) 2, 3, 3, 3, 3

78. The hand contains ____ carpals (wrist bones), ____ metacarpals (palm bones), and ___ phalanges. **[Pg-311,E]**

(A) 14, 5, 8 (B) 5, 8, 14 (C) 8, 5, 14 (D) 1, 5, 5

79.



[Pg-311,E]

The accompanied diagram shows right pectoral girdle and upper arm (frontal view). Identify A to G

(A) A- 1st Vertebra, B - Scapula, C -Humerus, D - Radius, E - Ulna, F - Carpals, G - Metacarpals

(B) A- Scapula, B - Clavicle, C - Humerus, D – Radius, E - Ulna, F - Carpals,

G - Metacarpal

(C) A- Ilium, B - Scapula, C - Humerus,D - Radius, E - Ulna, F - Carpals, G –

Metacarpals

(D) A- Clavicle, B - Scapula, C - Humerus, D - Radius, E - Ulna, F - Carpals, G –Metacarpals

80. An acromion process is characteristically found in - **[Pg-311,E]**

(A) Pelvic girdle of mammals (B) Pectoral girdle of mammals

(C) Skull bone (D) Vertebrae of mammals

81. The shoulder blade is large triangular bone situated in the dorsal part of the thorax between the 2nd and the 7th ribs. It is called _ **[Pg-311,E]**

(A) Clavicle (B) Ilium (C) Scapula (D) Carpals

82. For articulation of head of humerus a depression found in scapula is called – **[Pg-311,E]**

(A) Acetabulum (B) Manubrium

(C) Occipital condyle (D) Glenoid cavity

83. Which of the following statement is correct? **[Pg-311,M]**

(A) Pectoral and pelvic girdle bones help in the articulation of the upper and lower limbs respectively with the axial skeleton

(B) Each girdle is formed of 2 halves

(C) Each half of pectoral girdle consists of a clavicle (collar bone) and Scapula

(D) All

84. Which of the following statements is false? **[Pg-311,M]**

(A) Scapula has the spine which projects as acromion process

(B) Below acromion process is a glenoid cavity

(C) Each clavicle (collar bone) articulates with acromion

(D) Clavicle is long S-shaped bone with 4 curvatures

85. Which one of the following is the longest bone in human? **[Pg-311,E]**

(A) Radius (B) Tibia

(C) Femur (Thigh bone) (D) Clavicle (Collar bone)

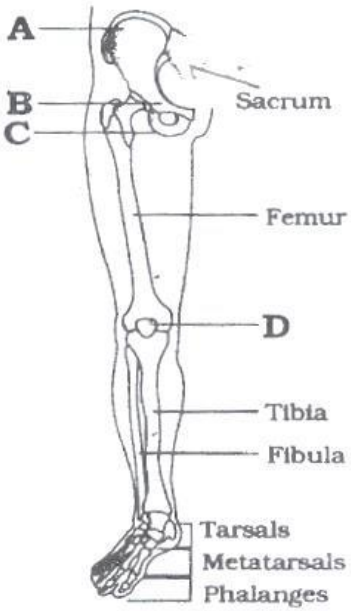
86. Human foot consists of 26 bones. Whatare the number of tarsals (ankle bones), metatarsals and phalanges? **[Pg-311,E]**

(A) 7, 5, 14 (B) 5, 7, 14 (C) 1, 1, 5 (D) 5, 5, 5

87. A cup shaped bone covering knee ventrally is called - **[Pg-311,E]**

(A) Cuneiform (B) Tarsal (C) Patella (D) Carpal

88. Study the accompanying figure. Identify A, B, C and D – **[Pg-311,E]**



(A) A- Pubis, B - ilium, C - Ischium, D - Patella

(B) A- Ischium, B - Pubis, C - ileum, D– Patella

(C) A- ileum, B - Pubis, C - Ischium, D– Patella

(D) A- ilium, B - Pubis, C - Ischium, D–Patella

89. Acetabulum occurs in - **[Pg-311,E]**

(A) Cranium (B) Pectoral girdle

(C) Pelvic girdle (D) Vertebrae

90. Pelvic girdle (hip girdle) is composed ____ coxal (hip) bones- **[Pg-311,E]**

(A) 3 (B) 2 (C) 4 (D) 5

91. Pelvic girdle consists of-

(A) Ileum, ischium and pubis

(B) Ilium, ischium and pubis

(C) Ilium, ischium and clavicle

(D) Coracoid, ischium and pubis

92. Two halves of pelvic girdle articulate ventrally at a fibrocartilaginous joint called - **[Pg-311,E]**

(A) Pubic symphysis (B) Synchodroses

(C) Gomphoses (D) Sutures

93. Each coxal bone is formed by the fusion of 3 bones named as - **[Pg-311,E]**

(A) Ileum, ischium and pubis (B) Ilium, ischium and pubis

(C) Ilium, ischium and clavicle (D) Coracoid, ischium and pubis

Para - 20.4

Joints

94. Which of the following statements about the joints is false? **[Pg-311,312,M]**

(A) Joints are essential for all types of movements involving bony parts

(B) Joints are contact between bones or between bones and cartilages

(C) Fibrous joints are immovable

(D) Cartilaginous joint permit great movement

95. Match Column I with Column II – **[Pg-312,M]**

	Column I		Column II
A.	Hinge joint	**I.**	Between humerus and pectoral girdle
B.	Pivot joint	**II.**	Between carpals and Metacarpals of thumb
C.	Gliding joint	**III.**	Between the carpals
D.	Saddle joint	**IV.**	Between atlas and axis
E.	Saddle joint	**V.**	Knee joint

(A) A- V, B - IV, C - III, D - II, E - I

(B) A- I, B - II, C - II, D - V, E - IV

(C) A- I, B - III, C - II, D - V, E - IV

(D)A-V, B-III, C-II, D-I, E-II

96. Which of the following statements is correct? **[Pg-312,M]**

(A) Synovial joints are characterised by synovial cavity with fluid between the articulating surface of two· bones

(B) Synovial joints are freely movable

(C) Ball and socket, hinge joint, gliding joints, pivot joints and saddle joints are the types of synovial joints

(D) All

97. Joint between bones in the form of sutures of human skull is -**[Pg-312,E]**

(A) Hinge joint (B) Synovial joint

(C) Cartilaginous joint (D) Fibrous joint

98. Which of the following statements is correct? **[Pg-312,M]**

(A) Movable skull bone is mandible

(B) We move our hands while walking for balancing

(C) Cartilaginous joints have little mobility due to fibrocartilage disc

between its articular ends e.g. intervertebral disc between centre of vertebrae

(D) All

Para-20.5 Disorders of Muscular and

Skeletal System

99. A disease associated with joint is – **[Pg-312,E]**

(A) Glaucoma (B) Arthritis (C) Paget's disease (D) Homer's syndrome

100. Gout is the inflammation of joints due to accumulation of - **[Pg-312,E]**

(A) Urea crystal (B) NH3

(C) Uric acid crystal (D) CaCO3 crystals

101. I. Age-related disorder characterised by decreased bone mass and increased chances of fracture

II. Causative factor deficiency of estrogen is common.

The above characters are associated with – **[Pg-312,M]**

(A) Gout (B) Osteoporosis (C) Arthritis (D) Polio

102. Myasthenia is an ____ disorder affecting neuromuscular junction leading to fatigue, weakening and paralysis of skeletal muscles - **[Pg-312,E]**

(A) Arthritis (B) Autoimmune (C) Agnosic (D) Amnesic

103. Tetany is the rapid spasm in muscles due to – **[Pg-312,E]**

(A) High Ca+2 in body fluid

(B) Low Ca+2 in body fluid

(C) High uric acid in body fluid

(D) High urea in blood

104. Progressive degeneration of skeletal muscles due to genetic disorder is called – **[Pg-312,E]**

(A) Myasthenia gravis

(B) Tetany

(C) Muscular dystrophy

(D) Myopia

105. Arthritis is - **[Pg-312,E]**

(A) Inflammation of muscles (B) Inflammation of bone

(C) Inflammation of joints (D) Inflammation of tongue

NEET PREVIOUS YEARS QUESTIONS

1. Calcium is important in skeletal muscle contraction because it **[2018]**
(a) binds to troponin to remove the masking of active sites on actin for myosin.
(b) sctivates the myosin ATPase by binding to it.
(c) prevents the formation of bonds between the myosin cross bridges and the actin filament.
(d) detaches the myosin head from the actin filament.

2. The pivot joint between atlas and axis is a type of : **[2017]**
(a) Cartilaginous joint (b) Synovial joint (c) Saddle joint (d) Fibrous joint

3. Out of 'X' pairs of ribs in humans, only 'Y' pairs are true ribs. Select the option that correctly represent values of X and Y and provides their explanation. **[2017]**
(a) X = 12, Y = 5 True ribs are attached dorsally to vertebral column and sternum on the two ends.
(b) X = 24, Y = 7 True ribs are dorsally attached to vertebral column but are free on ventral side.
(c) X = 24, Y = 12 True ribs are dorsally attached to vertebral column but are free on ventral side.
(d) X = 12, Y = 7 True ribs are attached dorsally to vertebral column and ventrally to the sternum.

4. Lack of relaxation between successive stimuli in sustained muscle contraction is known as__. **[2016]**
(a) spasm (b) fatigue (c) tetanus (d) tonus

5. Sliding filament theory can be best explained as **[2015]**
(a) Actin and myosin filaments shorten and slide pass each other.
(b) Actin and myosin filaments do not shorten but rather slide pass each other.
(c) When myofilaments slide pass each other, myosin filaments shorten while actin filaments do not shorten.
(d) When myofilaments slide pass each other actin filaments shorten while myosin filament do not shorten.

6. Which of the following is not a function of the skeletal system? **[2015]**
(a) Storage of minerals (b) Production of body heat (c) Locomotion (d) Production of erythrocytes

7. Which of the following joints would allow no movement? **[2015]**
(a) Cartilaginous joint (b) Synovial joint (c) Ball and Socket joint (d) Fibrous joint

8. Glenoid cavity articulates **[2015]**
(a) scapula with acromion. (b) clavicle with scapula.
(c) humerus with scapula. (d) clavicle with acromion.

9. Select the correct matching of the type of the joint with the example in human skeletal system. **[2014]**

	Type of joint	Example
(a)	Cartilaginous joint	Between frontal and pariental
(b)	Pivot joint	Between third and fourth cervical vertebrae
(c)	Hinge joint	Between humerus and pectoral girdle
(d)	Gliding joint	Between carpals

10. Which of the following muscular disorders is inherited? **(NEET-2019)**

(1) Tetany (2) Muscular dystrophy (3) Myasthenia gravis (4) Botulism

11. Select the correct option . **(NEET-2019)**

(1) 8th, 9th and 10th pairs of ribs articulate directly with the sternum.
(2) 11th and 12th pairs of ribs are connected to the sternum with the help of hyaline cartilage.
(3) Each rib is a flat thin bone and all the ribs are connected dorsally to the thoracic vertebrae and ventrally to the sternum.
(4) There are seven pairs of vertebrosternal, three pairs of vertebrochondral and two pairs of vertebral ribs.

12. Match the following joints with the bones involved: **(NEET-2019 ODISSA)**

(a) Gliding joint (i) Between carpal and metacarpal of thumb
(b) Hinge joint (ii) Between Atlas and Axis
(c) Pivot joint (iii) Between the carpals
(d) Saddle joint (iv) Between Humerus and Ulna.

Select the correct option from the following:
(1) (a)-(iii), (b)-(iv), (c)-(ii), d-(i) (2) (a)-(iv), (b)-(i), (c)-(ii), d-(iii)
(3) (a)-(iv), (b)-(ii), (c)-(iii), d-(i) (4) (a)-(i), (b)-(iii), (c)-(ii), d-(iv)

13. Which of the following diseases is an autoimmune disorder? **(NEET-2019 ODISSA)**

(1) Myasthenia gravis (2) Arthritis (3) Osteoporosis (4) Gout

14. Match the following columns and select the correct option **(NEET-2020 COVID)**

Column - I	Column - II
(a) Gout	(i) Decreased levels of estrogen
(b) Osteoporosis	(ii) Low Ca^{++} ions in the blood
(c) Tetany	(iii) Accumulation of uric acid crystals
(d) Muscular	(iv) Auto immune dystrophy disorder
	(v) Genetic disorder

(1) (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv) (2) (a)-(iii), (b)-(i), (c)-(ii), (d)-(v)
(3) (a)-(iv), .(b)-(v), (c)-(i), (d)-(ii) (4) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)

15. Match the following columns and select the correct option **(NEET-2020)**

Column – I		**Column – II**	
(a)	Floating Ribs	(i)	Located between second and seventh ribs
(b)	Acromion	(ii)	Head of the Humerus
(c)	Scapula	(iii)	Clavicle
(d)	Glenoid cavity	(iv)	Do not connect with the sternum

	(a)	(b)	(c)	(d)		(a)	(b)	(c)	(d)
1.	(iv)	(iii)	(i)	(ii)	2.	(ii)	(iv)	(i)	(iii)
3.	(i)	(iii)	(ii)	(iv)	4.	(iii)	(ii)	(iv)	(i)

16. Chronic auto immune disorder affecting neuro muscular junction leading to fatigue , weakening and paralysis of skeletal muscle is called as: **[NEET-2021]**

1. Muscular dystrophy 2. Myasthenia gravis
3. Gout 4. Arthritis

17. During muscular contraction which of the following events occur? **[NEET-2021]**

a) H-zone disappears b) 'A' band widens
c) I-band reduces in width d) Myosine hydrolyzes ATP, releasing the ADP and Pi
e) Z-lines attached to actins are pulled inwards

Choose the correct answer from the options given below.
1) (a), b), (c), (d) only 2) (b), (c), (d), (e) only 3) b), (d), (e), (a) only 4) (a), (c), (d), (e) only

18. Match List - I with List - II. **[NEET-2021]**

List – I	**List – II**
a) Scapula	i) Cartilaginous joint
b) Cranium	ii) Flat bone
c) Sternum	iii) Fibrous joints
d) Vertebral column	iv) Triangular flat bone

Choose the correct answer from the options given below

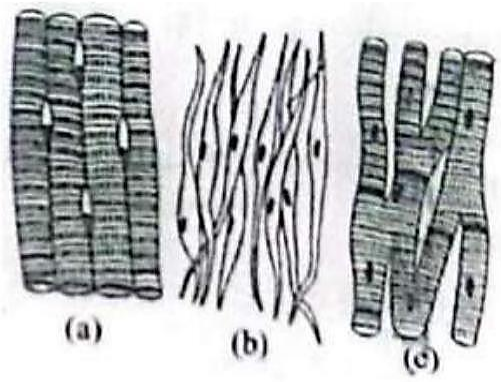
1) a-ii, b-iii, c-iv, d-I 2) a-iv, b-ii, c-iii, d-i 3) a-iv, b-iii, c-ii, d-i 4) a-i, b-iii, c-ii, d-iv

19. Which of the following is a correct match for disease and its symptoms? **[NEET-2022]**
1) Arthritis – Inflammed joints
2) Tetany – high Ca^{2+} level causing rapid spasms
3) Myasthemia gravis – Genetic disorder resulting in weakening and paralysis of skeletal muscle
4) Muscular dystrophy – An auto immune disorder causing progressive degeneration of skeletal muscle

20. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R). **[NEET-2022]**
Assertion (A): Osteoporosis is characterized by decreased bone mass and increased chances of fractures.
Reason (R): Common cause of osteoporosis is increased levels of estrogen.
In the light of the above statements, choose the most appropriate answer from the options given below:
1) Both (A) and (R) are correct and (R) is the correct explanation of (A)
2) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
3) (A) is correct but (R) is not correct
4) (A) is not correct but (R) is correct.

21. Which of the following is present between the adjacent bones of the vertebral column? **[NEET-2022]**
1) Intercalated discs 2) Cartilage
3) Areolar tissue 4) Smooth muscle

22. Three types of muscles are given as a, b and c. Identify the correct matching pair along with their location in human body:



Name of muscle/location

(a) (a) Smooth - Toes

(b) Skeletal - Legs

(c) Cardiac - Heart

(b) (a) Skeletal - Triceps

(b) Smooth - Stomach

(c) Cardiac - Heart

(c) (a) Skeletal - Biceps

(b) Involuntary - Intestine

(c) Smooth - Heart

(d) (a) Involuntary - Nose tip

(b) Skeletal – Bone

(c) Cardiac-Heart

[NEET 2024]

23. Which of the following statements are correct regarding skeletal muscle?
A. Muscle bundles are held together by collagenous connective tissue layer called fascicle.
B. Sarcoplasmic reticulum of muscle fibre is a store house of calcium ions.
C. Striated appearance of skeletal muscle fibre is due to distribution pattern of actin and myosin proteins.
D. M line is considered as functional unit of contraction called sarcomere.

Choose the most appropriate answer from the options given below:
(a) B and C only (b) A, C and D only
(c) C and D only (d) A, B and C only

[NEET 2023]

24.Match List I with List II :

List I
A. Fibrous joints
B. Cartilaginous joints
C. Hinge joints
D. Ball and socket joints

List II
I. Adjacent vertebrae, limited movement
II. Humerus and Pectoral girdle, rotational movement
III. Skull, don't allow any movement
IV. Knee, help in locomotion
Choose the correct answer from the options given below :
(a) A-IV, B-II, C-III, D-I
(b) A-I, B-III, C-II, D-IV
(c) A-II, B-III, C-I, D-IV
(d) A-III, B-I, C-IV, D-II

[NEET 2024]

25. Match List I with List II.

	List I (Type of Joint)		List II (Found between)
(A)	Cartilaginous Joint	(I)	Between flat skull bones
(B)	Ball and Socket Joint	(II)	Between adjacent vertebrae in vertebral column
(C)	Fibrous Joint	(III)	Between carpal and metacarpal of thumb
(D)	Saddle joint	(IV)	Between Humerus and Pectoral girdle

Choose the correct answer from the options given below:
(a) A-II, B-IV, C-I, D-III
(b) A-I, B-IV, C-III, D-II
(c) A-II, B-IV, C-III, D-I
(d) A-III, B-I, C-II, D-IV

[NEET 2023]

NCERT LINE BY LINE QUESTIONS – ANSWERS

1) A	**2)** C	**3)** D	**4)** B	**5)** D	**6)** D	**7)** D	**8)** C	**9)** D	**10)** B
11) C	**12)** D	**13)** D	**14)** D	**15)** D	**16)** A	**17)** B	**18)** C	**19)** B	**20)** D
21) D	**22)** A	**23)** C	**24)** A	**25)** C	**26)** B	**27)** C	**28)** C	**29)** A	**30)** D
31) C	**32)** C	**33)** B	**34)** B	**35)** C	**36)** A	**37)** C	**38)** B	**39)** C	**40)** B
41) B	**42)** A	**43)** A	**44)** B	**45)** D	**46)** B	**47)** D	**48)** A	**49)** B	**50)** C
51) B	**52)** A	**53)** D	**54)** A	**55)** B	**56)** C	**57)** B	**58)** B	**59)** B	**60)** A
61) B	**62)** D	**63)** C	**64)** C	**65)** C	**66)** A	**67)** B	**68)** B	**69)** D	**70)** C
71) B	**72)** B	**73)** A	**74)** B	**75)** C	**76)** B	**77)** D	**78)** C	**79)** D	**80)** B
81) C	**82)** D	**83)** D	**84)** D	**85)** C	**86)** A	**87)** C	**88)** D	**89)** C	**90)** B

91) B	**92)** A	**93)** B	**94)** D	**95)** D	**96)** D	**97)** D	**98)** D	**99)** B	**100)** C
101) B	**102)** B	**103)** B	**104)** C	**105)** C					

NEET PREVIOUS YEARS QUESTIONS-ANSWERS

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

11 (4) **12** (1) **13** (1) **14** (2) **15** (1) **16** (2) **17** (4) **18** (3) 19 (1) 20 (3) 21 (2)

22(b) 23(a) 24(d) 25(a) 26() 27()

NEET PREVIOUS YEARS QUESTIONS-EXPLANATIONS

1. (a) The sarcoplasmic reticulum to release calcium ions into the muscle interior where they bind to troponin, thus causing tropomyosin to shift from the face of the actin filament to which myosin heads need to bind to produce contraction.

2. (b) Pivot joint is a type of synovial joint which provides free movement between atlas and axis vertebrae of vertebral column.

3. (d) In human, 12 pairs of ribs are present out of which 7 pairs of ribs (1st to 7th pair) are dorsally attached to vertebral column and ventrally to the sternum.

4. (c) Sustained contraction with no relaxation phase is called muscle tetanus. Tetanus also called lockjaw, is a serious infection caused by *Clostridium tetani*.

5. (b)

6. (b) Production of body heat is caused by the process of metabolism (respiration).

7. (d) Fibrous joint (immovable joint) is an attachment between bones, being held together by fibrous
connective tissue. For example, suture between skull bones.

8. (c) Glenoid cavity articulates humerus with scapula.
Glenoid cavity is a shallow, pyriform articular, surface. which is located on the lateral angle of the scapula.

9. (d) A gliding joint is a common type of synovial joint formed between bones that meet at flat or nearly flat articular surfaces. Gliding joints allow the bones to glide past one another in any direction along the plane of the joint - up and down, left and right, and diagonally. Many gliding joints are formed in the appendicular skeleton between the carpal bones of the wrist; between the
carpals and the metacarpals of the palm; between the tarsal bones of the ankle; and between the tarsals and the metatarsals of the foot.

15. (a) 11th and 12th pairs of ribs are not connected ventrally and are therefore, called floating ribs.

(b) Acromion is a flat expanded process of spine of scapula.

(c) Scapula is a flat triangular bone in the dorsal part of the thorax between 2nd and the 7th rib.

(d) Glenoid cavity of scapula articulates with head of the humerus to form the shoulder joint.

16. Myasthenia gravis is the auto-immune disorder affecting the neuro muscular junction

About us

BioResire (NEET | CSIR NET | Biotech Internships) is a life sciences research and training organization dedicated to bridging the gap between academic learning and industry skills. We provide internships, projects, and programs in Bioinformatics, Biotechnology, Molecular Biology, Cancer Research, Neuroscience, and related fields, helping students build job-oriented scientific careers.

"The future belongs to those who explore the unseen — where biology meets innovation and discovery begins."

17. H-zone disappears, I-band reduces in width, Myosine hydrolyzes ATP, releasing the ADP and Pi and Z-lines attached to actins are pulled inwards are the events which takes place during muscle contraction, whereas 'A' band remains constant
18. Scapula - Triangular flat bone
Cranium - Fibrous joints
Sternum - Flat bone
Vertebral column - Cartilaginous joint
19. **Correct** - Arthritis – Inflammed joints
Incorrect
Tetany – low ca^{++}
Myasthenia gravis –autoimmune disorder
Muscular dystrophy – Genetic disorder
20. R is incorrect-low level of oestrogen cause osteoporosis
21. Cartilage tissue is present between the adjacent bones of the vertebral column

22.Ans.(b)
Explanation
The correct answer is option (b) as
Figure (a) represents skeletal muscle fibres which are closely attached to skeletal bones. In a typical muscle such as triceps and biceps, striated muscle fibres are bundled together in a parallel fashion.
Figure (b) represents smooth muscle fibres which are present in the wall of internal organs such as the blood vessels, stomach and intestine.
Figure (c) represents cardiac muscle fibres which are exclusively present in the heart.

23.Ans.(a)
Explanation
Option (a) is the correct answer because statements B and C are only correct statements while *A* and *D* are incorrect statements.
Muscle bundles are held together by collagenous connective tissue layer called fascia. Muscle bundles are called fascicles. The portion of the myofibril between two successive 'Z' lines is considered as functional unit of contraction called sarcomere

24.Ans.(d)
Explanation
The correct answer is option no. (d) as

- Fibrous joints do not allow any movement. This type of joint is shown by the flat skull bones which fuse end-to-end with the help of dense fibrous connective tissues in the form of sutures.
- Cartilaginous joint is present between the adjacent vertebrae in the vertebral column and this permits limited movements.
- Hinge joint is a type of synovial joint present in knee, help in locomotion
- Ball and socket joint is also a type of synovial joint present between humerus and pectoral girdle and allows rotational movement.

25.Ans.(a)
Explanation
A) Cartilaginous Joint : These joints are connected by cartilage and allow limited movement. They are found between adjacent vertebrae in the vertebral column.
B) Ball and Socket Joint : These joints consist of a ball-like structure fitting into a socket, allowing for a wide range of movement. They are found between the humerus and the pectoral girdle.
C) Fibrous Joint : These joints are connected by fibrous connective tissue and allow little or no movement. They are found between flat skull bones.

D) Saddle Joint : These joints have two bones with concave and convex surfaces that fit together, allowing movement in two planes. They are found between the carpal and metacarpal of the thumb.
So, the correct matching is :
A-II, B-IV, C-I, D-III