

**Chapter-09**  
**LOCOMOTION AND MOVEMENT**

**Each question carry one score**

- Observe the first pair of words and write a suitable word for the second  
a) Actin : Thin filament  
.....: Thick filament  
b) F actin : G actin  
Myosin :.....  
c) Head of Meromyosin : HMM  
Tail of meromyosin :.....
- Write any 2 contractile protein involved in muscle contraction?
- Human have.....pairs of Ribs  
a)12 b)24 c)11 d)10
- Expand  
a)HMM b)LMM
- Which theory explains muscle contraction?
- Find the odd one and suggest reason for selection  
a)Ball and socket joint, saddle joint, pivot joint, Joint between adjacent vertebrae  
b)Gout, Arthritis, Asthma, Osteoporosis
- Which complex protein is distributed at regular intervals on the tropomyosin?
- What you meant by neuromuscular junction ?
- The junction between a motor neuron and the sarcolemma of the muscle fibre is called.....
- Which ion is responsible for muscle contraction  
a)Ca b)Mg c)Fe d)Zn
- What is the type of movable joint present between the atlas and axis?  
(a) Pivot (b) Saddle (c) Hinge (d) Gliding
- ATPase of the muscle is located in  
(a) actin (b) troponin  
(c) myosin (d) Tropomyosin
- Which one of the following options is incorrect?  
(a) Hinge joint – between humerus and pectoral girdle

- Pivot joint – between atlas, axis and occipital condyle
- Gliding joint – between the carpals
- Saddle joint – between carpal and metacarpals of thumb

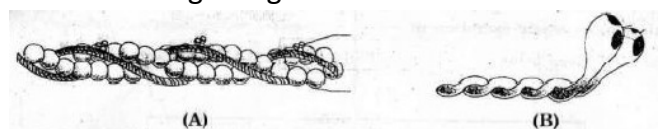
- Knee joint and elbow joints are examples of  
(a) saddle joint  
(b) ball and socket joint  
(c) pivot joint  
(d) hinge joint
- In old age, people often suffer from stiff and inflamed joints. What is this condition called?

**Each question carry two score**

- Match the following

Types of joints	Examples
Ball and socket joint	Between carpals
Pivot joint	Between carpal and metacarpal of thumb
Gliding joint	Atlas and axis
Saddle joint	Shoulder joint

- The important finding in the case sheet of Two patients A and B show that both are suffering from the disorder of the skeletal system  
a) Patient A is suffering from inflammation of the joint due to accumulation of uric acid crystal  
b) Patient B shows decreased bone mass and decreased level of oestrogen Identify the disorder Or Diseases of A and B?
- Major steps involved in muscle contraction are given below, which are not in the correct order. Arrange them in the correct order.  
(a) Remove the mask of active sites for binding myosin  
(b) A signal sent out by CNS  
(c) Binding of Ca<sup>+</sup> with troponin  
(d) Release of a neuro-transmitter substance  
(e) Release of Ca<sup>+</sup> into the sarcoplasm
- Observe the figures given below



- Identify figure 'A' and 'B'.
- Name the subunits of 'A' and 'B'.

20. "A contracted muscle become shorter and thicker but its volume remains the same"

- a) Which theory explains the process of muscle contraction?
- b) Identify two contractile proteins present in the muscle?

21. Human ribs are called Bicephalic, Explain ?

22. Rewrite the given sentences if there is any **mistake** in the underlined part.

- Human have 12 pairs of ribs
- First seven pairs of ribs are called Floating ribs
- The 8th, 9th and 10th pairs of ribs is called True ribs
- Last two pairs of ribs are called Floating ribs

23. With respect to rib cage, explain the following:

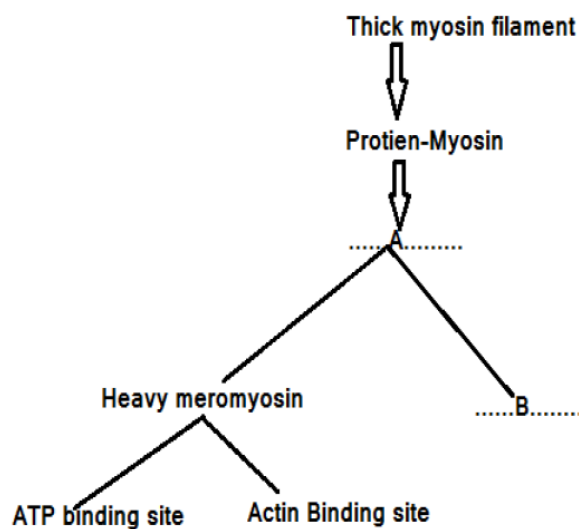
- a) Bicephalic ribs
- b) True ribs
- c) Floating ribs

24. Give two examples for each of the following

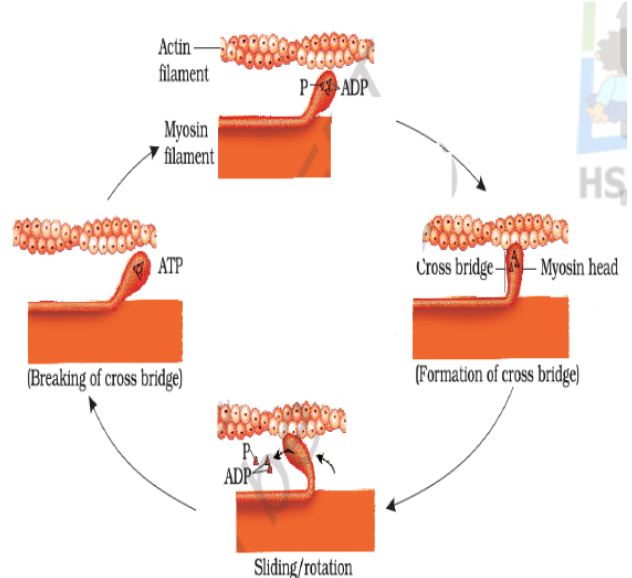
- a) synovial joints
- b) muscular proteins

25. What are the bones in the RIB CAGE? What is its main function ?

26. Complete the following chart showing structure of myosin filament and its protein .



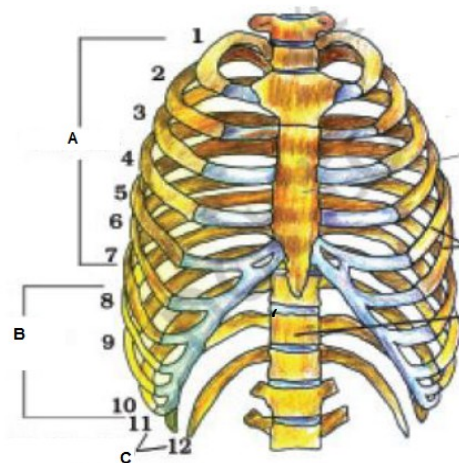
27. Explain the mechanism of muscle contraction based on the figure shown below



28. Match the following and choose the correct option.

Types of synovial joints	Bones involved
A Ball and socket	1. Carpal and metacarpal of thumb
B Hinge	2. Atlas and axis
C Pivot	3. Frontal and parietal
D Saddle	4. Knee
	5. Humerus and

29. Figure shown below is the Rib cage of Human being



- a) Label A, B and C Bones
- b) Why human ribs is called cephalic

30. Joints are points of contact between bones, or between bones and cartilages

- a) What are the function of joints
- b) what are the 3 types of joints?
- c) Where you can find Hinge joint

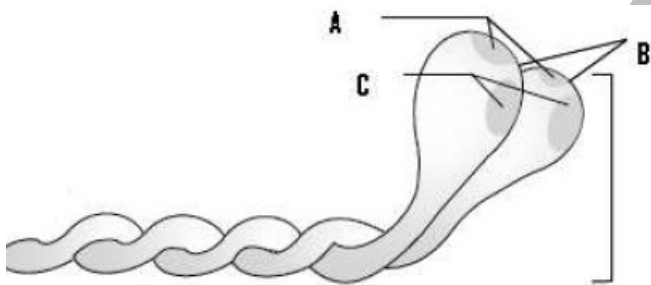
**Each question carry three score**

- 31. Write any 3 difference between Red muscle fibre and White muscle fibre ?
- 32. Identify the disorders based on the symptoms given below.
  - a) It is the Inflammation of joints.
  - b) Inflammation of joints due to accumulation of uric acid crystals.
  - c) Age-related disorder characterised by decreased bone mass and increased chances of fractures
- 33. Draw a flow chart showing physiological processes involved in the formation of cross bridge during muscle contraction ?
- 34. Label A,B and C



- A) Identify the diagram
- b) Label A,B and C

35.



- A) Identify the diagram
- b) Label A,B and C

36. Match the following

Column A	Column B
First seven pairs of ribs	Floating ribs
The 8th, 9th and 10th pairs of ribs	True ribs
11th and 12th pair of Ribs are called	Vertebrochondral ribs

37. Explain sliding filament theory of muscle contraction

Ans: Sliding filament theory states that contraction of a muscle fibre takes place by the sliding of thin filaments over the thick filaments. Muscle contraction is initiated by a neural signal sent by CNS to neuromuscular junction via a motor neuron. The signal reaching the

junction releases a neurotransmitter (acetylcholine) which generates an action potential in the sarcolemma. This spreads through the muscle A fibre and causes the release of calcium ions into the sarcoplasm. Increase in  $Ca^{2+}$  level leads to the binding of calcium with a subunit of troponin on actin filaments and thereby remove the masking of active sites for myosin. Utilising the energy from ATP hydrolysis, A myosin head now binds to the exposed active sites on actin to form a cross bridge. This leads to pulling of attached actin filaments towards the centre of 'A' band.

The 'Z' line attached to these actins are also pulled inwards thereby causing a shortening of the sarcomere, i.e., contraction. During contraction of the muscle the T bands reduce, whereas the 'A' bands retain the length. The myosin, releasing the ADP and  $P_i$  goes back to its relaxed state. A new ATP binds and the cross bridge is broken. The ATP is again hydrolysed by the myosin head and the cycle of cross bridge formation and breakage is repeated causing further sliding. This process continues till the  $Ca^{2+}$  ions are pumped back to the sarcoplasmic reticulum resulting in the masking of actin filaments. This leads to the return of "Z" lines back to their original position i.e., relaxation.



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