

CBSE TEST PAPER-01
CLASS - XI BIOLOGY
(Locomotion and Movement)

General Instruction:

- All questions are compulsory.
 - Question No. 1 to 3 carry one marks each. Question No. 4 to 6 carry two marks each. Question No. 7 and 8 carry three marks each. Question No. 9 carry five marks.
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1. Name the functional contractile unit of muscle.

2. What is arthritis?

3. What is the total number of bones present in the left pectoral girdle and the left arm respectively in a normal human?

4. List functions of skeleton in higher animals?

5. Define a joint.

6. What is osteoporosis? Name two factors which are responsible for osteoporosis.

7. Explain the initiation of muscle contraction. What is the role of sarcoplasmic reticulum, Myosin head and F – actin during contraction in striated muscles?

8. What are the three types of muscle tissue? Write two characteristic points about the structure of each of them?

9. What is the role of Ca^{++} and ATP in muscle contraction?

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[ANSWERS]

Ans 01. Sarcomere.

Ans 02. Arthritis is a disease causing inflammation and stiffness of the joints.

Ans 03. Left pectoral girdle – 2 bones ; Left arm – 3 bones

Ans 04. i) Skeletal system forms the framework for the body.

ii) The bone and cartilage of the skeletal system protects delicate internal organs of the body.

iii) Skeleton provides attachment surface for the body muscles, tendons and other similar structures and thus helps in movement

iv) It gives shape and posture to the body.

Ans 05. The point of articulation of two or more bones or of a bone and cartilage, are called joints. Joints are of different types to allow different types and degrees of the movement. Some joints are freely movable like knee, elbow and shoulders. They have lubricating synovial fluid to allow free movement. Some joints permit very little movement like joints between jaws. Some joints are immovable like joints between bones of skull.

Ans 06. Osteoporosis is an age dependent systemic disorder, characterized by low bone–mass and micro–architectural deterioration of the bones. This increases risk of bone weakness and chances of bone breakage also increase.

Factors – (1) Deficiency of calcium & vitamin D.

(2) Imbalance of hormones like parathyroid hormone, thyrocalcitonin and sex hormones.

Ans 07. The muscle contraction is initiated by a stimulus that arrives at the surface of the muscle at neuromuscular junction in form of neurotransmitters. The action potential is conveyed to all the muscle fibres at the motor unit. At the opening of each transverse tubule onto the muscle fibre surface the action potential spreads inside the muscle fibre.

Role of Sarcoplasmic Reticulum: It releases calcium ions, that bind to the troponin and bring about conformational changes; so the active site on F – actin for myosin becomes exposed.

Role of Myosin head : It provides the specific binding site for F – actin to form cross – bridges,

it also contains sites for ATP complex formation with Mg ions.

Role of F – actin: F – actin are specific to myosin head for cross bridge formation.

Ans 08. There are three types of muscle tissue:

(i) Striated / Skeletal muscles –

The muscle fibers are cylindrical, unbranched and show prominent striations due to repeating patterns of myofilaments.

They are innervated by voluntary nervous system.

They are under the control of conscious mind and be moved at will.

Attached to skeletal system and are responsible for their movement.

(ii) Smooth muscles –

They are not striated and contains less myosin and cannot generate much tension.

They are innervated by autonomic nervous system.

They are involuntary in nature.

They are found in organs and helps in digestion and respiration

(iii) Cardiac muscles –

They are striated like skeletal muscles, but differ in the plasma membrane composition and action potential.

These muscles are found exclusively in the heart.

They are involuntary in nature.

Ans 09. A nerve impulse arriving at neuromuscular junction stimulates contractile response.

Due to the depolarization of the surface of sarcomeres it spreads quickly. Neurotransmitter is released at the enormous collar junction. It enters into the sarcomere through membrane channel. Na^+ moves inside the sarcomere. It is called inflow of Na^+ . Action potential is generated in the sarcomere. Action potential travels to the full length of muscle fiber.

The sarcoplasmic reticulum, then release the Ca^{2+} which is stored here. It binds to the specific sites found in the hooping of the thin filament, called actins. Change takes place in troponin active sites of F – actin, which are then exposed to myosin head. Myosin head

shows Mg^{2+} dependent ATPase activity. During relaxation of muscle Ca^{2+} is pumped back into sarcoplasmic reticulum. Consequently the troponin component is freed to inhibit the active sites for myosin head and cross bridges between filaments are broken. The filaments assume their normal positions and muscle fiber is then in a relaxed state.

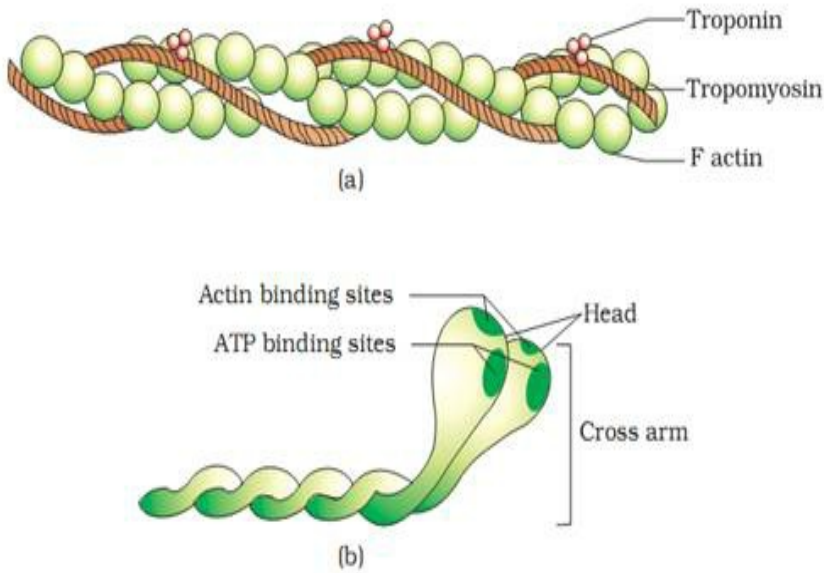


Figure 20.3 (a) An actin (thin) filament (b) Myosin monomer (Meromyosin)

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