ENTRANCE TEST 2020
MDCAT
TEST # 3
BIOLOGY

Q.1 Functional unit of contractile system in a skeletal muscle is:

A) Myofibril
B) Sarcolemma
C) A band
D) Sarcomere

Explanation:

F.Sc Book II, Chapter 16, Page 39

A sarcomere is the region of a myofibril between two successive Z -line and is the smallest contractile unit of muscle fibre. The myofibrils contain myofilaments.

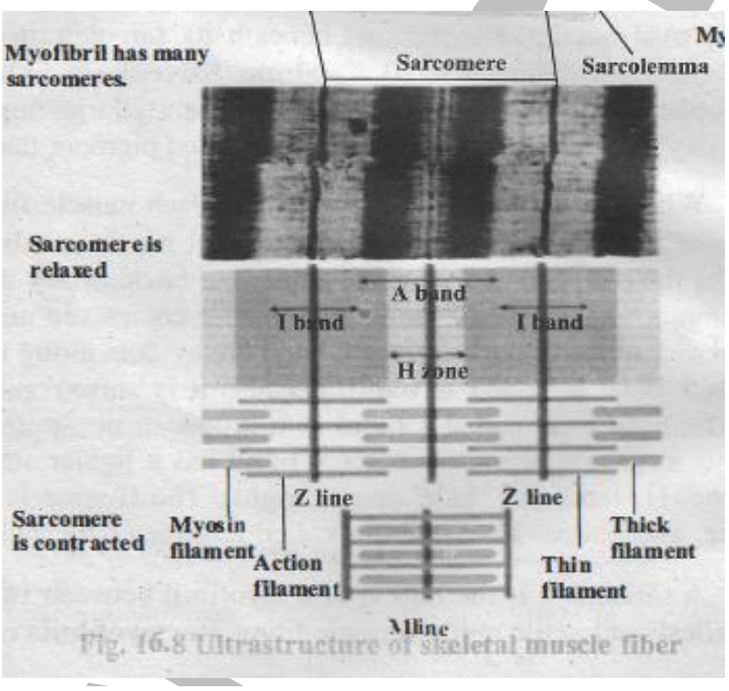
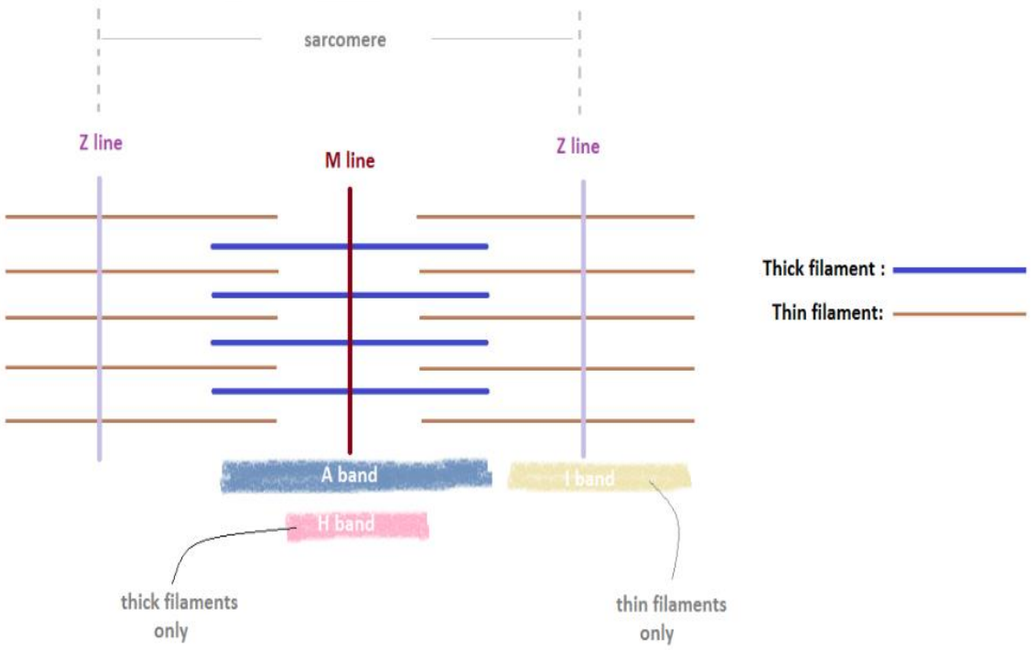


Fig. 16.8 Ultrastructure of skeletal muscle fiber

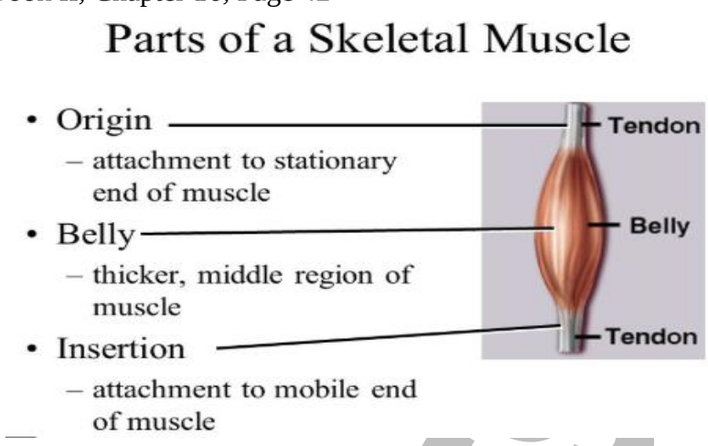


Q.2 _____ is the thickest part of muscle between origin and insertion:

A) Ligament
C) Belly
B) Tendon
D) Myofilament

Explanation:

F.Sc Book II, Chapter 16, Page 42



Q.3 Which one of the following is also considered as muscle cell?

A) Myofibril
C) Muscle fiber
B) Muscle bundle
D) Myofilament

Explanation:

F.Sc Book II, Chapter 16, Page 39

Skeletal muscles → Muscle bundles → Muscle → fibers(Muscle cells) → Myofibrils → Sarcomere → Myofilaments

Q.4 _____ consists of many thread like structures called myofilaments:

A) Muscle bundle
C) Myofibril
B) Myosin filament
D) Sarcomere

Explanation:

F.Sc Book II, Chapter 16, Page 39

Skeletal muscles → Muscle bundles → Muscle fibers (Muscle cells) → Myofibrils → Sarcomere → Myofilaments

Q.5 Sarcoplasmic reticulum in muscle cell is like endoplasmic reticulum but devoid of:

A) Sarco-tubules
C) Repeating pattern
B) Ca^{+2} ions
D) Ribosomes

Explanation:

F.Sc Book II, Chapter 16, Page 41
Yellow Box

Q.6 In each sarcomere a series of _____ and _____ band are evident along the length of each myofibril:

A) Thick, dark
C) Dark, light
B) Thin, light
D) Dark, thin

Explanation:

F.Sc Book II, Chapter 16, Page 39

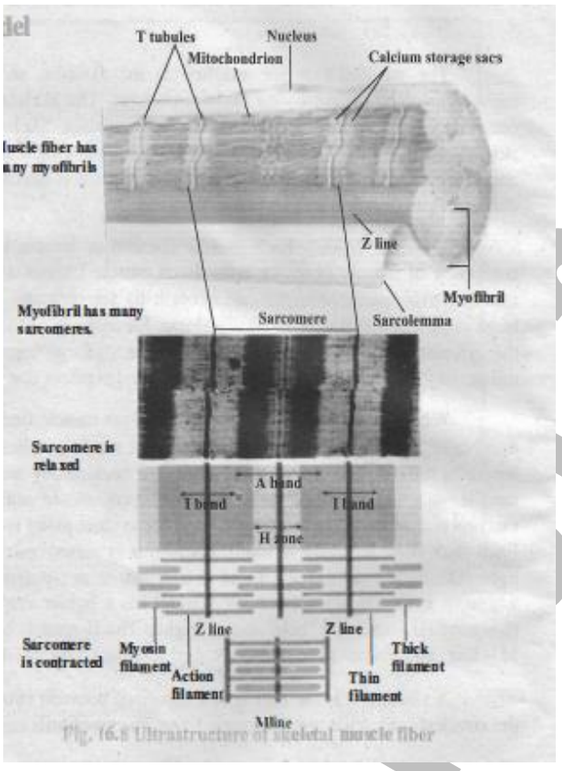


Fig. 16.8 Ultrastructure of skeletal muscle fiber

Q.7 Pick up the ranges of diameter of skeletal muscle fibres:

A) 1 – 2 µm
B) 7 – 8 µm
C) 5 – 10 µm
D) 10 – 100 µm

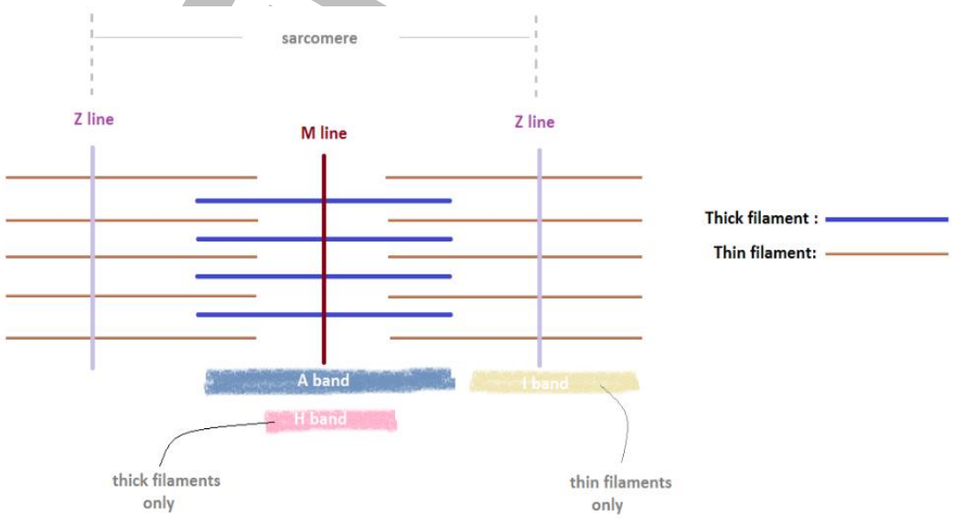
Explanation:

F.Sc Book II, Chapter 16, Page 39

Q.8 The thin filaments extend across the _____ and partly in _____:

A) A band, I band
B) I band, M line
C) A band, Z line
D) I band, A band

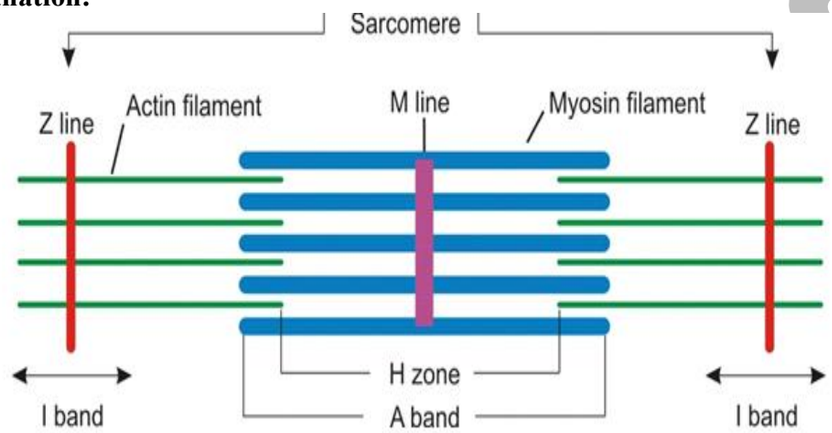
Explanation:



Q.9 Each A band has a lighter stripe in its mid-section called:

A) M line
B) Z line
C) Sarcomere
D) H zone

Explanation:



Q.10 The shape of skeletal muscles cell/fibre is:

A) Branched
B) Cylindrical
C) Spindle
D) Spindle or cylindrical

Explanation:

Property	Smooth	Cardiac	Skeletal
Muscle appearance	Unstriped	Irregular stripes	Regular stripes
Cell shape	Spindle	Branched	Spindle or cylindrical
Number of nuclei	One per cell	Many per cell	Many per cell
Speed of contraction	Slow	Intermediate	Slow to rapid
Contraction caused by	Spontaneous, stretch, nervous system, hormones	Spontaneous	Nervous system
Function	Controls movement of substances through hollow organs	Pumps blood	Moves the skeleton
Voluntary control	Usually no	Usually no	Yes

Fig. 16.7 Location, characteristics, and functions of the three muscle types.

Q.11 The thick filaments in a myofibril of muscles are composed chiefly of:

A) Myosin molecule
B) Actin molecule
C) Troponin molecule
D) Tropomyosin molecule

Explanation:

F.Sc Book II, Chapter 16, Page 39

Q.12 The _____ are about 7 – 8 nm in diameter:

A) Intermediate filaments
B) Microfilaments
C) Thick filaments
D) Thin filaments

Explanation:

F.Sc Book II, Chapter 16, Page 39

Q.13 Each myofibril has light and dark bands, which give the fibre its striped appearance because of this _____ muscles are also called striated muscles:

A) Cardiac
B) Smooth
C) Skeletal
D) Circular

Explanation:

F.Sc Book II, Chapter 16, Page 39

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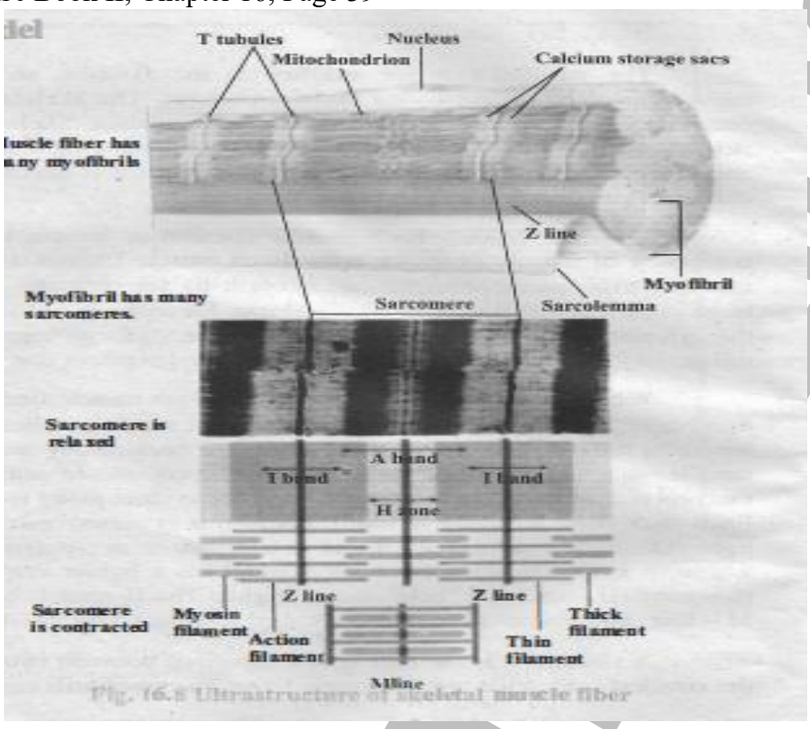
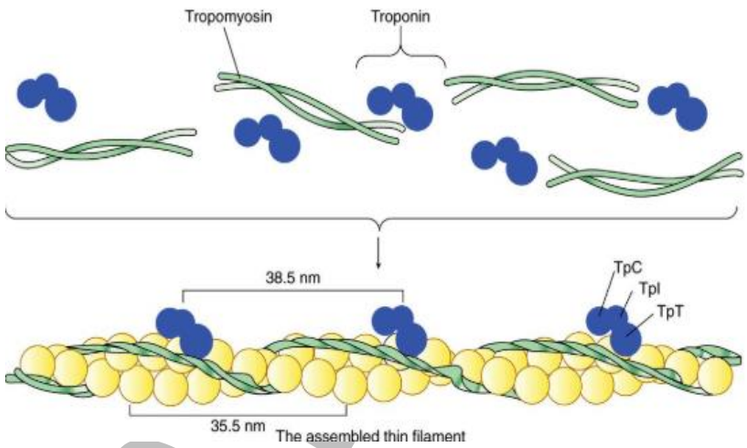


Fig. 16.8 Ultrastructure of skeletal muscle fiber

Q.14 Troponin is a complex of _____ polypeptide chains:

A) Two
C) Four
B) Three
D) Five

Explanation:



Q.15 The type of muscle present in our:

A) Heart is involuntary and unstriated smooth muscle
B) Intestine is striated and involuntary
C) Thigh is striated and voluntary
D) Upper arm is smooth muscle and fusiform in shape

Explanation:

Cardiac muscles are found in the wall of the heart. It is involuntary and slightly striated. Smooth muscles are found in gastrointestinal tract. These are non-striated and involuntary. Striated (or skeletal) muscles are found in the limbs and body walls. These muscles are voluntary (under the control of animal's will) and show dark and light bands thus are striated.

Q.16 _____ muscles are consciously controlled:

A) Cardiac
B) Skeletal
C) Smooth
D) Unstriped

Explanation:

Property	Smooth	Cardiac	Skeletal
Muscle appearance	Unstriped	Irregular stripes	Regular stripes
Cell shape	Spindle	Branched	Spindle or cylindrical
Number of nuclei	One per cell	Many per cell	Many per cell
Speed of contraction	Slow	Intermediate	Slow to rapid
Contraction caused by	Spontaneous, stretch, nervous system, hormones	Spontaneous	Nervous system
Function	Controls movement of substances through hollow organs	Pumps blood	Moves the skeleton
Voluntary control	Usually no	Usually no	Yes

Fig. 16.7 Location, characteristics, and functions of the three muscle types.

Q.17 Each muscle fibre is surrounded by a modified cell membrane called:

A) Sarcolemma
B) Sarcomere
C) Myosin filament
D) Myofilament

Explanation:

F.Sc Book II, Chapter 16, Page 39

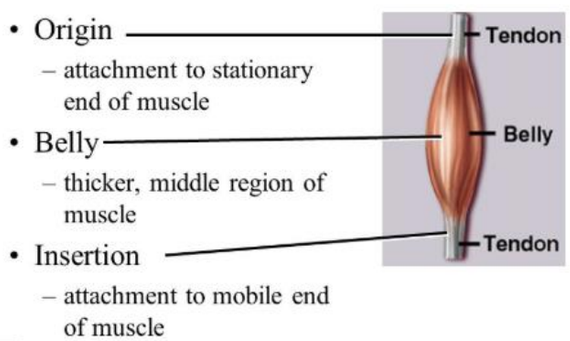
Q.18 The structure which joins a muscle to a bone is called:

A) Tendon
B) Ligament
C) Belly
D) Sarcolemma

Explanation:

F.Sc Book II, Chapter 16, Page 42

Parts of a Skeletal Muscle



Q.19 _____ can polarize visible light:

A) H zone of sarcomere
B) M line of sarcomere
C) I band of sarcomere
D) A band of sarcomere

Explanation:

F.Sc Book II, Chapter 16, Page 39

The A-**Band** in skeletal muscle fibres is so **named** because it is **anisotropic** in its refractive index which is a characteristic of orderly crystalline structure. If yes, then that indicates that the myosin filaments are **anisotropic** in themselves and actin filaments are **isotropic**.

Q.20 Each muscle fibre is a long cylindrical cell with multiple oval nuclei arranged just beneath its:

A) Sarcomere
B) Sarcolemma
C) Nuclear envelope
D) Sarcoplasmic reticulum

Explanation:

F.Sc Book II, Chapter 16, Page 39

Q.21 The function of calcium ions in muscle contraction is to:

A) Bind to troponin molecule and cause them to move
B) Aid in the transmission of nerve impulse
C) Polarize visible light
D) Bind to tropomyosin molecule and cause them to form cross bridges

Explanation:

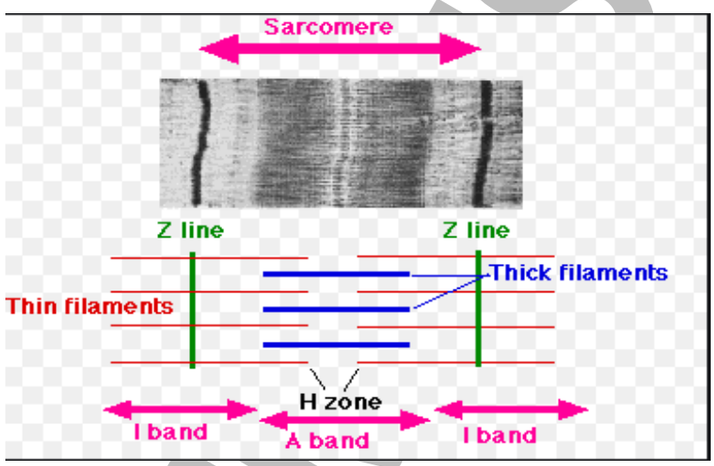
Ca_{2+} ions play an important role in muscle contraction by creating interactions between the proteins, myosin and actin. The Ca2+ ions bind to the C component of the actin filament, which exposes the binding site for the myosin head to bind to in order to stimulate a muscle contraction.

Q.22 Where can we find Z-line in the fine structure of skeletal muscles myofibril?

A) In the mid of A-band
B) In I-band
C) In the mid of H-zone
D) Along the I-band

Explanation:

A line in the centre of I-band (Z= Zwishen means between), from here actin filaments arise.

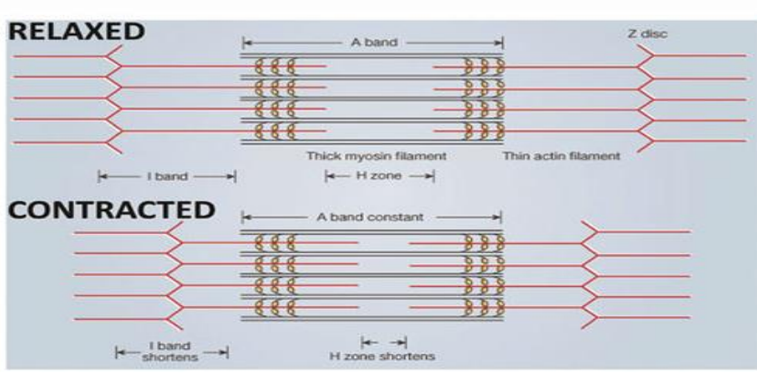


Q.23 During contraction phase, which part of sarcomere is brought close together:

A) I band
B) A band
C) Z line
D) H-band

Explanation:

During muscle contraction, laterally projecting heads (cross bridges) of the thick myosin myofilaments come in contact with the thin actin myofilaments and rotate on them. This pulls the thin myofilaments toward the middle of the sarcomere, past the thick myofilaments. The Z lines come closer together and the sarcomere becomes shorter. Length of the A band remains constant. Myofilaments (both actin and myosin) stay the same length. Free ends of actin myofilaments move closer to the centre of the sarcomere, bringing Z lines closer together. I bands shorten and H zone narrows. A similar action in all the sarcomeres results in shortening of the entire myofibril and thereby of the whole fibre and whole muscle.



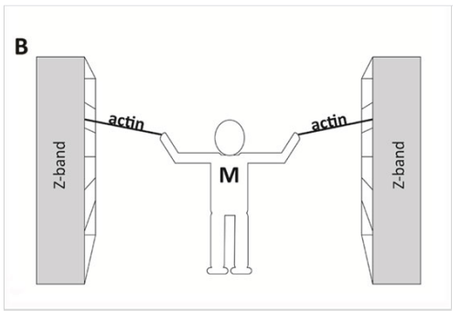
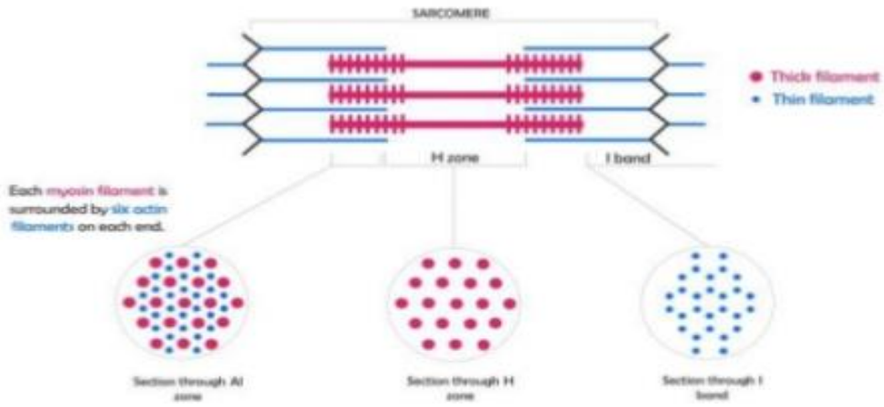


Figure 2: Comparison of a relaxed and contracted sarcomere
(A) The basic organization of a sarcomere subregion, showing the centralized location of myosin (A band). Actin and the z discs are shown in red. (B) A conceptual diagram representing the connectivity of molecules within a sarcomere. A person standing between two bookcases (z bands) pulls them in via ropes (actin). Myosin (M) is analogous to the person and the pulling arms. (z bands are also called z discs.)

Q.24 Each myosin filament is surrounded by _____ actin filaments on both ends:

A) 5
B) 6
C) 10
D) 12

Explanation:
F.Sc Book II, Chapter 16, Page 39



Q.25 At rest, 1/5 of the _____ is broken aerobically:

A) Creatine phosphate
B) Glucose
C) Glycogen
D) Lactic acid

Explanation:
F.Sc Book II, Chapter 16, Page 41

Q.26 Each muscle consists of:

A) Muscle fibers
B) Muscle bundles
C) Myofibrils
D) Myofilaments

Explanation:
F.Sc Book II, Chapter 16, Page 39
Each muscle consists of muscle bundles, which are further composed of muscle fibres or cells.

Q.27 Rigor mortis occurs due to the deficiency of:

A) Water
B) Calcium
C) Oxygen
D) ATP

Explanation:
F.Sc Book II, Chapter 16, Page 40

Q.28 An action potential in a muscle fibre causes the release of calcium ions from:

A) Sarcoplasm
B) Sarcolemma
C) Sarcoplasmic reticulum
D) Myofilament

Explanation:

F.Sc Book II, Chapter 16, Page 41

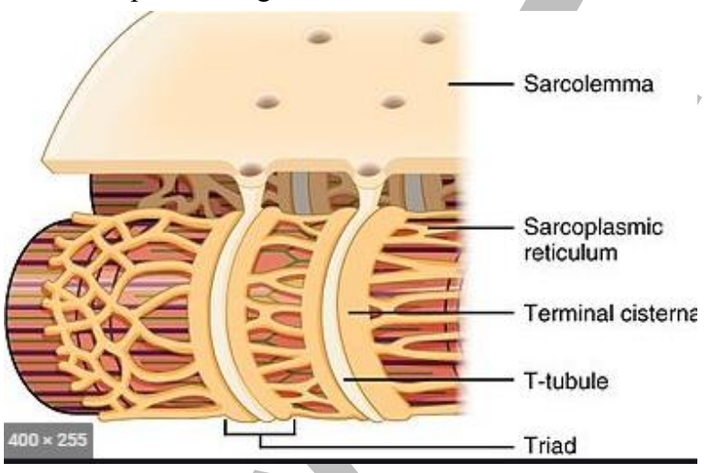
Nerve Impulse ⇨ Motor Neuron ⇨ Neuromuscular Junction ⇨ Sarcolemma ⇨ T-tubule ⇨ SR ⇨ Release of Ca^{+2} into sarcoplasm ⇨ Binding of Ca^{+2} with troponin ⇨ Displacement of troponin ⇨ Displacement of tropomyosin ⇨ Binding sites exposed ⇨ Attachment of cross bridges

Q.29 The thousands of T-tubules of each muscle cell are collectively called:

A) Triad system
C) T-system
B) Muscle system
D) Sarcoplasmic reticulum system

Explanation:

F.Sc Book II, Chapter 16, Page 41



Q.30 Supply of ATP is maintained by the aerobic breakdown of:

A) Glucose
C) Glycogen
B) Creatine phosphate
D) Lactic acid

Explanation:

F.Sc Book II, Chapter 16, Page 41

Stored glycogen produces glucose. Aerobic breakdown of glucose in muscle cells produces ATP.

Q.31 Term "Hele" means:

A) Dark
C) Compact
B) Hollow
D) Bright

Explanation:

F.Sc Book II, Chapter 16, Page 39

Greek **meaning**: **Bright**, shining one. Estonian **meaning**: **Bright**, shining one.

Q.32 Majority of muscles tissue in human body is of:

A) Smooth type
C) Cardiac type
B) Circular type
D) Skeletal type

Explanation:

F.Sc Book II, Chapter 16, Page 42

Q.33 _____ remains fixed during muscle contraction:

A) Insertion
C) Origin
B) Belly
D) Tendon

Explanation:

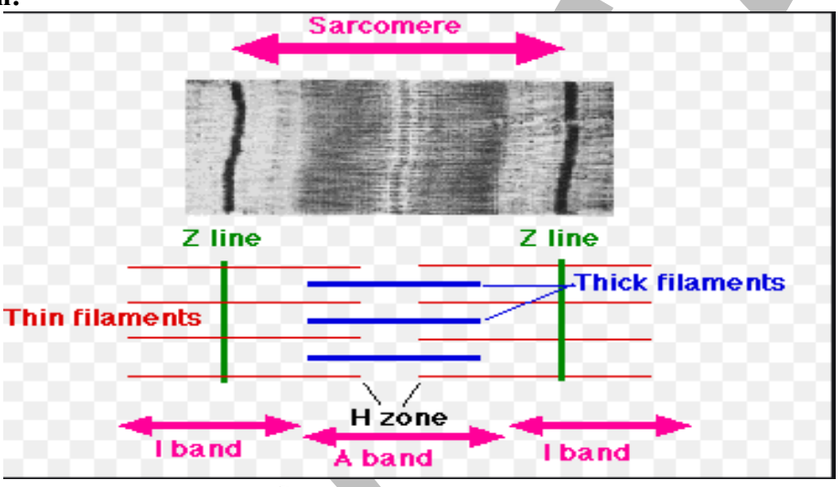
F.Sc Book II, Chapter 16, Page 42

Insertion	End of muscle that moves the bone.
Belly	Contractile part between origin and insertion
Origin	End of muscle, which remains fixed
Tendon	A tendon is a fibrous connective tissue which attaches muscle to bone. It serves to move the bone or structure

Q.34 Its length is determined by thick filament:

A) I-band
B) H-zone
C) A-band
D) Z-line

Explanation:



Q.35 Myoglobin is present in:

A) Sarcoplasmic reticulum
B) Nucleus
C) Sarcomere
D) Sarcoplasm

Explanation:

F.Sc Book II, Chapter 16, Page 39

Q.36 Each light band is called:

A) I band
B) A band
C) H zone
D) M line

Explanation:

F.Sc Book II, Chapter 16, Page 39
The light band called I band is isotropic or non-polarizing

Q.37 These are huge cells:

A) Cardiac muscle fibres
B) Smooth muscle fibres
C) Involuntary muscle fibres
D) Skeletal muscle fibres

Explanation:

F.Sc Book II, Chapter 16, Page 39
Skeletal muscle fibres are huge cells.

Q.38 There are 650 _____ in human body:

A) Bones
B) Hairs
C) Muscles
D) Joints

Explanation:

F.Sc Book II, Chapter 16, Page 43
There are 650 muscles in human body, most of which occur in pairs.

Q.39 When muscle is at rest tropomyosin covers the sites on the_____ chain?

A) Myosin
C) Troponin
B) Actin
D) Myoglobin

Explanation:

F.Sc Book II, Chapter 16, Page 40

When the muscle is at rest, the tropomyosin is disposed in such a way that it covers the sites on tlie actin chain where the head of myosin becomes attached.

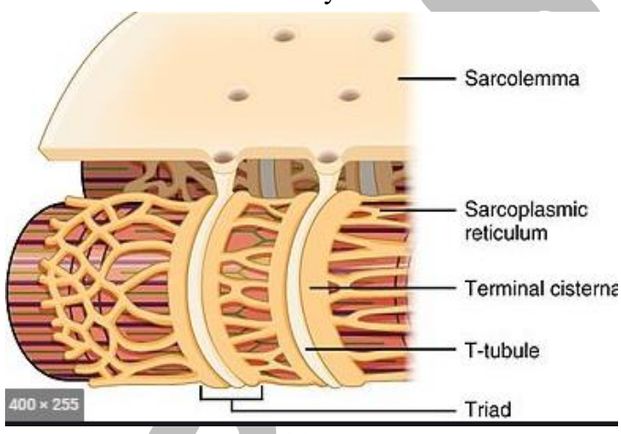
Q.40 T-tubules of muscle fibers are formed by:

A) Invagination of sarcolemma
C) Degeneration of sarcolemma
B) Outgrowth of sarcolemma
D) Thickening of sarcolemma

Explanation:

F.Sc Book II, Chapter 16, Page 41

T-tubules are **invaginations** of the **sarcolemma**, extending into the interior of the **muscle fiber** as the sarcotubular system



Q.41 A large number of myofilaments together constitute a:

A) Muscle bundle
C) Myofibril
B) Muscle fiber
D) Sarcomere

Explanation:

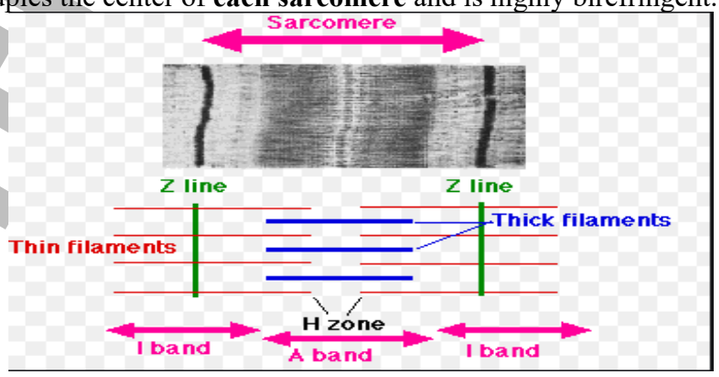
Skeletal muscles → Muscle bundles → Muscle fibers (Muscle cells) → Myofibrils → Sarcomere → Myofilaments

Q.42 Each sarcomere has a central:

A) A band
C) Z-line
B) I band
D) Thin filament

Explanation:

Within **each sarcomere**, the A and I **bands** are seen; the A **band**, lying between two I **bands**, occupies the center of **each sarcomere** and is highly birefringent.



Q.43 All the muscle fibers triggered by a single neuron contract simultaneously as a single:

A) Associated unit
C) Motor unit
B) Sensory unit
D) Inter unit

Explanation:

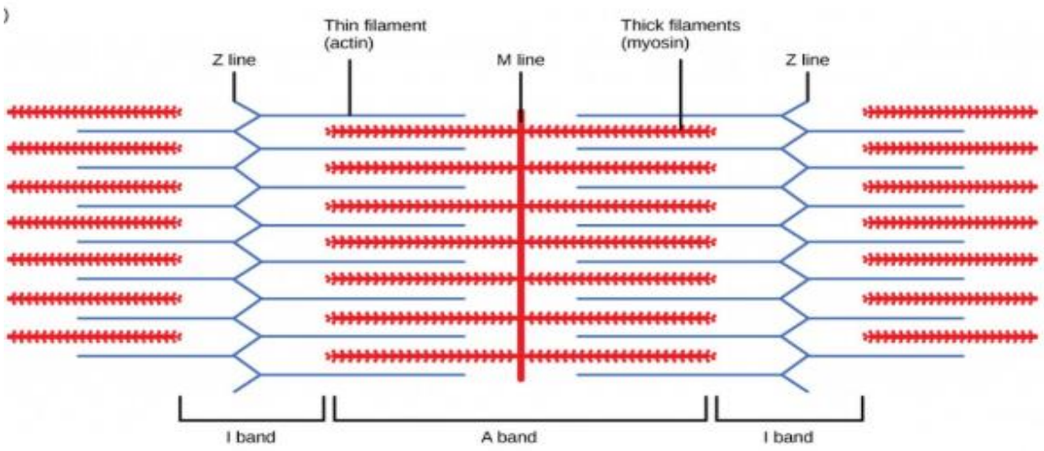
F.Sc Book II, Chapter 16, Page 41

Muscle contraction is initiated by nerve impulse arriving at the neuromuscular junction. All the fibres innervated by a single motor neuron are a "motor unit" and contract simultaneously in response to the action potential fired by the motor neurons.

Q.44 Z line lies between two consecutive:

A) Thick filaments
C) Myosin filaments
B) Thin filaments
D) Microfilaments

Explanation:



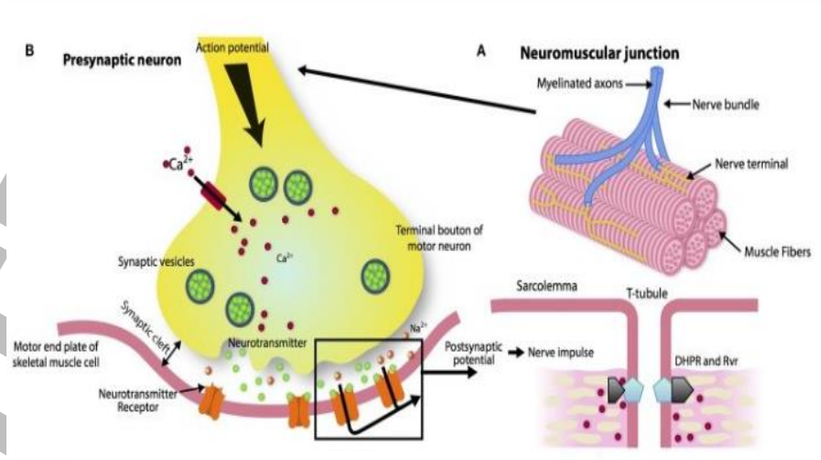
Q.45 The synapse formed between a motor neuron and a muscle fiber is called:

A) Neuro junction
C) Muscular junction
B) Neuromuscular junction
D) Inter junction

Explanation:

F.Sc Book II, Chapter 16, Page 41

A **neuromuscular junction** (or myoneural **junction**) is a chemical synapse between a motor neuron and a muscle fiber.



Q.46 A red pigment that store oxygen within the muscle cell is called:

A) Glycogen
C) Muscle hemoglobin
B) Hemoglobin
D) Creatine phosphate

Explanation:

F.Sc Book II, Chapter 16, Page 39

Q.47 At rest, _____ lactic acid change into glucose:

A) 1/5
C) 3/5
B) 4/5
D) 2/5

Explanation:

F.Sc Book II, Chapter 16, Page 41
At rest, 1/5 of the lactic acid is broken aerobically and its energy is used to change the Remaining 4/5 lactic acid into glucose.

Q.48 Troponin binds to all of the following, EXCEPT:

A) Ca^{+2} ion
C) Tropomyosin
B) Actin
D) Myosin

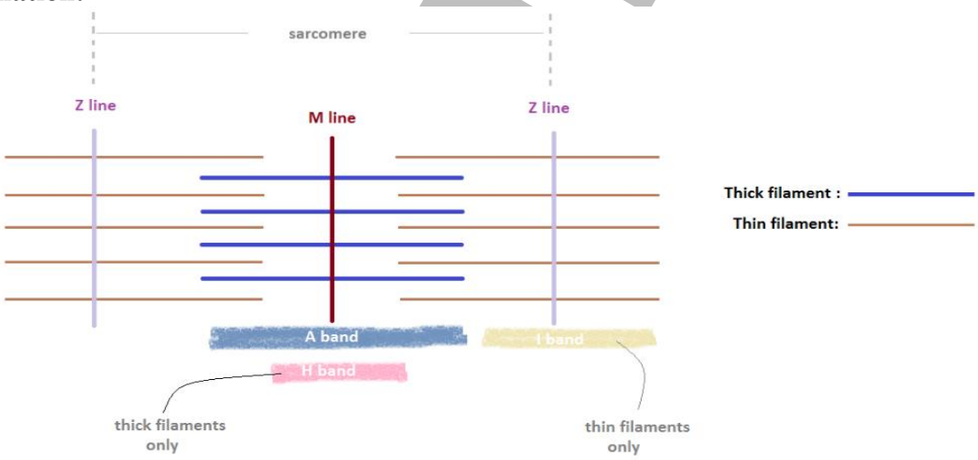
Explanation:

F.Sc Book II, Chapter 16, Page 39
It is actually three polypeptide complex, one binds to actin, another binds to tropomyosin while third binds calcium ions.

Q.49 It extends the entire length of the A-band of sarcomere:

A) Actin filaments
C) Thin and thick filaments
B) Thin filaments
D) Central thick filaments

Explanation:



Q.50 A mechanoenzyme protein that, in the form of thick filaments, interacts with actin to bring about the contraction of muscle cells called:

A) Troponin
C) Myosin
B) Actin
D) Myoglobin

Explanation:

F.Sc Book II, Glossary, Page-XI