Locomotion and Movement

Question1

Match List-I with List-II:

	List-I Location of Joint		List-II Type of Joint
A.	Joint between humerus and pectoral girdle	I	Gliding joint
B.	Knee joint	II	Ball and Socket joint
C.	Joint between atlas and axis	III	Hinge joint
D.	Joint between carpals	IV	Pivot joint

Chose the correct answer from the options given below:

[NEET 2024 Re]

Options:

A.

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

B.

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

C.

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

D.

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

Answer: A

Solution:

Option (1) is the correct answer because

	List-I Location of Joint		List-II Type of Joint
A.	Joint between humerus and pectoral girdle	II	Ball and Socket joint
B.	Knee joint	III	Hinge joint
C.	Joint between atlas and axis	IV	Pivot joint
D.	Joint between carpals	I	Gliding joint

Thus, A-II, B-III, C-IV, D-I is the correct match.

Question2

Select the correct statements regarding mechanism of muscle contraction.
A. It is initiated by a signal sent by CNS via sensory neuron.
B. Neurotransmitter generates action potential in the sarcolemma.
C. Increased Ca^{++} level leads to the binding of calcium with troponin on action filaments.
D. Masking of active site for actin is activated.
E. Utilising the energy from ATP hydrolysis to form cross bridge.

Choose the most appropriate answer from the options given below

[NEET 2024 Re]

Options:

A.

B, C and E only

B.

C, D and E only

C.

A and D only

D.

B, D and E only

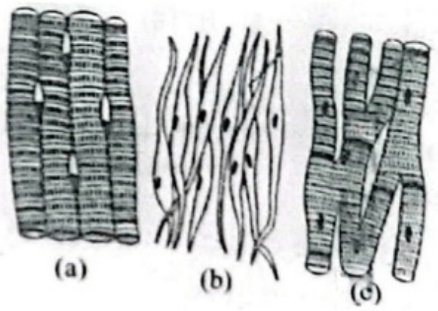
Answer: A

Solution:

The correct answer is option (1) as muscle contraction is initiated by a signal sent by the CNS via a motor neuron. A neural signal reaching the neuromuscular junction releases a neurotransmitter (acetylcholine) which generates an action potentialin the sarcolemma. This spreads through the muscle fibre and causes the release of Ca^{2+} into the sarcoplasm. Increase in Ca2+ level leads to the binding of calcium with a subunit of troponin on actin filaments and thereby remove themasking of active sites for myosin. Utilising the energy from ATP hydrolysis, the myosin head now binds to the exposed active sites on actin to form a cross bridge.

Question3

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

[NEET 2024]

Options:

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

Answer: B

Solution:

The correct answer is option (2) 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.

Question4

Match List I with List II :

	List-I		List-II
A.	Fibrous joints	I.	Adjacent vertebrae, limited movement

B.	Cartilaginous joints	II.	Humerus and Pectoral girdle, rotational movement
C.	Hinge joints	III.	Skull, don’t allow any movement
D.	Ball and socket joints	IV.	Knee, help in locomotion

Choose the correct answer from the options given below :

[NEET 2024]

Options:

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

Answer: D

Solution:

The correct answer is option no. (4) 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.

Question5

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:
[NEET 2023]

Options:

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

Answer: A

Solution:

Solution:

Option (1) is the correct answer because cartilaginous joint is present in between the adjacent vertebrae in the vertebral column.
Option (2) is not the answer because cartilaginous joint is not present between flat skull bones.
Option (3) is not the answer because fibrous joint is not present in between the carpal and metacarpal of thumb.
Option (4) is not the answer because saddle joint is not present in between humerus and pectoral girdle.

Question6

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: [NEET 2023]

Options:

A.

B and C only

B.

A, C and D only

C.

C and D only

D.

A, B and C only

Answer: A

Solution:

Solution:

Option (1) 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.

Question7

According to the sliding filament theory [NEET Re-2022]

Options:

A. The actin filaments slide away from A-band resulting in shortening of sarcomere.

B. Actin and myosin filaments slide over each other to increase the length of the sarcomere.

C. Length of A-band does not change.

D. I-band increases in length.

Answer: C

Solution:

Solution:

In sliding filament theory, skeletal muscle shortens during contraction because the thin filaments (Actin) slide past over the thick filaments (Myosin)

Thus, the I band gets reduced and the A band retains its length.

As the thin filaments slide inwards the Z discs come close together, and sarcomere shortens.

Question8

Gout is a type of disorder which leads to : [NEET Re-2022]

Options:

A. Weakening of bones due to low calcium level

B. Inflammation of joints due to accumulation of uric acid crystals

C. Weakening of bones due to decreased bone mass

D. Inflammation of joints due to cartilage degeneration

Answer: B

Solution:

Gout is a metabolic disease characterised by increased production of uric acid and deposition of uric acid crystals in the joints leading to inflammation of the joints.

Question9

Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A):
Osteoporosis is characterised by decreased bone mass and increased chance 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
[NEET-2022]

Options:

A. Both(A) and (R) are correct and (R) of explanation is the correct (A)

B. Both (A) and (R) are correct but (R) is not the correct explanation of (A)

C. (A) is correct but (R) is not correct

D. (A) is not correct but (R) is correct

Answer: C

Solution:

Option (3) is the correct answer as osteoporosis is due to decreased levels of oestrogen.

Osteoporosis is an age-related disorder characterised by decreased bone mass hence, the chances of fractures increase.

Question10

Which of the following is a correct match for disease and its symptoms?
[NEET-2022]

Options:

A. Arthritis - Inflammed joints

B. Tetany - High Ca^{2+} level causing rapid spasms.

C. Myasthenia gravis - Genetic disorder resulting in weakening and paralysis of skeletal muscle

D. Muscular dystrophy - An auto immune disorder causing progressive degeneration of skeletal muscle

Answer: A

Solution:

Option (1) is the correct answer because Arthritis is inflammation of joints.

Option (3) is incorrect because myasthenia gravis is an immune disorder affecting neuro-muscular junction leading to fatigue, weakening and paralysis of skeletal muscle.

Option (4) is incorrect because muscular dystrophy is progressive degeneration of skeletal muscle mostly due to genetic disorder.

Option (2) is incorrect because tetany is rapid spasms in muscle due to low mathrmCa^{++} in body fluid.

Question11

Which of the following is present between the adjacent bones of the vertebral column?
[NEET-2022]

Options:

A. Intercalated discs

B. Cartilage

C. Areolar tissue

D. Smooth muscle

Answer: B

Solution:

Solution:

Option (2) is the correct answer because cartilage forming the intervertebral disc is present between the adjacent bones of the vertebral column and it is a type of cartilaginous joint.

Option (3) is incorrect because areolar tissue present beneath the skin is a type of loose connective tissue.

Option (4) is incorrect because smooth muscles are present in the visceral organs.

Option (1) is incorrect because intercalated discs are characteristic feature of cardiac muscles present in heart.

Question12

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

Options:

A. Arthritis

B. Muscular dystrophy

C. Myasthenia gravis

D. Gout

Answer: C

Solution:

Solution:
• Option (3) is correct because myasthenia gravis is a chronic auto immune disorder affecting neuromuscular junction leading to fatigue, weakening and paralysis of skeletal muscle.
• Gout is caused due to deposition of uric acid crystals in joints leading to its inflammation.
• Inflammation of joints is commonly known as arthritis.
• Muscular dystrophy is a genetic disorder which results in progressive degeneration of skeletal muscle.

Question13

Match List-I with List-II

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

Choose the correct answer from the options given below [NEET 2021]

Options:

A. (a)-(iii) (b)-(i) (c)-(iv) (d)-(ii)

B. (a)-(i) (b)-(ii) (c)-(iii) (d)-(iv)

C. (a)-(ii) (b)-(iii) (c)-(i) (d)-(iv)

D. (a)-(iv) (b)-(iii) (c)-(ii) (d)-(i)

Answer: B

Solution:

● Scapula is a large triangular flat bone situated in the dorsal part of the thorax between the second and the seventh ribs.
● Fibrous 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, to form the cranium.
● Sternum is a flat bone on the ventral midline of thorax.
● Cartilaginous joints between the adjacent vertebrae in the vertebral column permits limited movements.

Question14

During muscular contraction which of the following events occur?
(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:
[NEET 2021]

Options:

A. (a), (c), (d), (e) only

B. (a), (b), (c), (d) only

C. (b), (c), (d), (e) only

D. (b), (d), (e), (a) only

Answer: A

Solution:

Solution:
The correct option is (1) because the length of A-band is retained. During muscle contraction, the following events occur:
(1) The globular head of myosin acts as ATPase and hydrolyses ATP molecule and eventually leads to the formation of cross bridge.
(2) This pulls the actin filament towards the centre of 'A-band'.
(3) The Z-line attached to these actins are also pulled inwards thereby causing a shortening of the sarcomere.
(4) The thin myofilaments move past the thick myofilaments due to which the H-zone narrows.
This reduces the length of I-band but retains the length of A-band.
(5) The myosin then releases ADP+Pi, and goes back to its relaxed state.

Question15

Match the following columns and select the correct option.

Column-I	Column-II
(a) Floating Ribs	(i) Located betweensecond andseventh ribs
(b) Acromion	(ii) Head of theHumerus
(c) Scapula	(iii) Clavicle
(d) Glenoid cavity	(iv) Do not connectwith the sternum

[2020]

Options:

A. (a) (b) (c) (d)
(i) (iii) (ii) (iv)

B. (a) (b) (c) (d)
(iii) (ii) (iv) (i)

C. (a) (b) (c) (d)
(iv) (iii) (i) (ii)

D. (a) (b) (c) (d)
(ii) (iv) (i) (iii)

Answer: C

Solution:

Solution:
(c) 11th and 12th pairs of ribs are not connected ventrally and are therefore, called floating ribs. Acromion is a flat expanded process of spine of scapula. The lateral end of clavicle articulates with acromion process. Scapula is a flat triangular bone in the dorsal part of the thorax between 2nd and the 7 th rib. Glenoid cavity of scapula articulates with head of the humerus to form the shoulder joint.

Question16

Match the following joints with the bones involved:

Column-I	Column-II
(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 :
[2019, Odisha]

Options:

A. (a)-(i), (B)-(iii), (C)-(ii), (D)-(iv)

B. (a)-(iii), (B)-(iv), (C)-(ii), (D)-(i)

C. (a)-(iv), (B)-(i), (C)-(ii), (D)-(iii)

D. (a)-(iv), (B)-(ii), (C)-(iii), (D)-(i)

Answer: B

Solution:

Solution:
Gliding joint is present between the carpals. Hinge joint is present between humerus and ulna. Pivot joint is present between atlas and axis. Saddle joint is present between carpal and metacarpal of thumb.

Question17

Select the correct option:
[2019]

Options:

A. 8^{th} , 9^{th} and 10^{th} pairs of ribs articulate directly with the sternum.

B. 11^{th} and 12^{th} pairs of ribs are connected to the sternum with the help of hyaline cartilage.

C. Each rib is a flat thin bone and all the ribs are connected dorsally to the thoracic vertebrae and ventrally to the sternum.

D. There are seven pairs of vertebrosternal, three pairs of vertebrochondral and two pairs of vertebral ribs.

Answer: D

Solution:

Solution:
There are 12 pairs of ribs in human body. First seven pairs are attached to the sternum ventrally with the help of hyaline carlilage, also called as true ribs. These are called vertebrosternal ribs. The next three pairs (8th, 9th and 10th) do not articulate directly with the sternum, also called vertebrochondral (false) ribs . The last two pairs (11th and 12th) are the free floating ribs because they are not connected ventrally.

Question18

Which of the following diseases is an autoimmune disorder ? [2019, Odisha]

Options:

A. Gout

B. Myasthenia gravis

C. Arthritis

D. Osteoporosis

Answer: B

Solution:

Solution:
Myasthenia gravis is autoimmune disorder that affects neuromuscular junction leading to fatigue, weakening and paralysis of skeletal muscles.
Arthritis is inflammation of one or more joints. It is characterised by pain, stiffness and limited function of joints.
Gout, a type of metabolic arthritis (diet related) is inflammation of joints due to accumulation of uric acid crystals. It can cause painful swelling in joints and typically affects the big toe.
Osteoporosis is agerelated disorder characterised by decreased bone mass and increased chances of fractures. It starts with the roughening of cartilage.

Question19

Which of the following muscular disorders is inherited? [2019]

Options:

A. Tetany

B. Muscular dystrophy

C. Myasthenia gravis

D. Botulism

Answer: B

Solution:

Muscular dystrophy is a inheritable disease that gradually cause the muscles to weaken, leading to an increasing level of disability.
Tetany, Myasthenia gravis and Botulism are not inheritable diseases.

Question20

Which of the following is not an autoimmune disease? [2018]

Options:

A. Psoriasis

B. Rheumatoid arthritis

C. Vitiligo

D. Alzheimer’s disease

Answer: D

Solution:

Solution:
Alzheimer’s disease is a neurodegenerative disorder due to deficiency of neurotransmitter acetylcholine. Rheumatoid arthritis is an autoimmune disorder in which antibodies are produced against the synovial membrane and cartilage. Vitiligo causes white patches on skin also characterized as autoimmune disorder. Psoriasis is a skin disease that causes itchy or sore patches of thick red skin and is also autoimmune.

Question21

Which of the following hormones can play a significant role in osteoporosis? [2018]

Options:

A. Aldosterone and Prolactin

B. Progesterone and Aldosterone

C. Parathyroid hormone and Prolactin

D. Estrogen and Parathyroid hormone

Answer: D

Solution:

(d) Osteoporosis has 3 causes: excess parathyroid hormone, advanced age, and lack of estrogen in older females. Estrogen promotes the activity of osteoblast and inhibits osteoclast. Parathormone promotes mobilisation of calcium from bone into blood. Excessive activity of parathormone causes demineralisation leading to osteoporosis.

Question22

The pivot joint between atlas and axis is a type of (NEET 2017)

Options:

A. cartilaginous joint

B. synovial joint

C. saddle joint

D. fibrous joint

Answer: B

Solution:

Solution:
(b) Pivot joint is a type of synovial joint which provide freely movement between atlas and axis vertebrae of vertebral column.

Question23

Out of ′X′ pairs of ribs in humans only ′Y′ pairs are true ribs. Select the option that correctly represents values of X and Y and provides their explanation. (NEET 2017)

Options:

A. X = 12, Y = 5 True ribs are attached dorsally to vertebral column and sternum on the two ends

B. X = 24, Y = 2 The 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

Answer: D

Solution:

(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

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Question24

Name the ion responsible for unmasking of active sites for myosin for cross-bridge activity during muscle contraction.
(NEET II 2016)

Options:

A. Calcium

B. Magnesium

C. Sodium

D. Potassium

Answer: A

Solution:

Solution:
(a) : Calcium ion plays an important role in muscle contraction. Calcium ions bind to troponin causing a change in its shape and position. Thus, in turn alters shape and position of tropomyosin to which troponin binds. This shift exposes the active sites on F-actin molecules. Myosin cross-bridge are then able to bind to these active sites.

Question25

Osteoporosis, an age-related disease of skeletal system, may occur due to
(NEET II 2016)

Options:

A. immune disorder affecting neuromuscular junction leading to fatigue

B. high concentration of Ca^{++} and Na^{+}

C. decreased level of estrogen

D. accumulation of uric acid leading to inflammation of joints

Answer: C

Solution:

(c) : Osteoporosis is reduction in bone mineral density, resulting in bones that are brittle and liable to fracture. Infection, injury and synovitis can cause localised osteoporosis of adjacent bone. Generalised osteoporosis is common in the elderly and in women after menopause. After menopause the estrogen levels in blood plasma are much reduced. Estrogen helps to regulate bone cells called osteoclasts which are responsible for building new bone. When estrogen levels drop fewer osteoclasts are produced resulting in osteoporosis.

Question26

Lack of relaxation between successive stimuli in sustained muscle contraction is known as (NEET I 2016)

Options:

A. tetanus

B. tonus

C. spasm

D. fatigue

Answer: A

Solution:

Solution:
(a) : Tetanus refers to continued state of contraction of a muscle resulting from the summation of a series of rapid muscular contractions (twitches) that are induced by repeated stimulation of the muscle.

Question27

Which of the following is not a function of the skeletal system? (2015)

Options:

A. Production of body heat

B. Locomotion

C. Production of erythrocytes

D. Storage of minerals

Answer: A

Solution:

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

Question28

Which of the following joints would allow no movements? (2015)

Options:

A. Synovial joint

B. Ball and Socket joint

C. Fibrous joint

D. Cartilaginous joint

Answer: C

Solution:

Solution:
(c) : Fibrous or immovable joints are the joints in which no movement occurs between the bones concerned. White fibrous tissue is present between the ends of the bones. Fibrous joint occurs between the bones of the skull called sutures and the joints between the teeth and the maxilla and the teeth and the mandible.

Question29

Stimulation of a muscle fiber by a motor neuron occurs at (2015)

Options:

A. the neuromuscular junction

B. the transverse tubules

C. the myofibril

D. the sacroplasmic reticulum

Answer: A

Solution:

(a) : A neuron that transmits a stimulus to muscle tissue is called motor neuron. A motor unit consists of a single motor neuron (nerve cell) and the muscle fibres it innervates. The portion of the muscle plasma membrane (sarcolemma) that lies beneath the nerve endings (axon terminals) is called the motor end plate. The axon terminals and the motor end plate together constitute the neuro-muscular junction or neuromotor junction.

Question30

Sliding filament theory can be best explained as (2015 Cancelled)

Options:

A. actin and myosin filaments do not shorten but rather slide pass each other

B. when myofilaments slide pass each other, myosin filaments shorten while actin filaments do not shorten

C. when myofilaments slide pass each other actin filaments shorten while myosin filaments do not shorten

D. actin and myosin filaments shorten and slide pass each other

Answer: A

Solution:

Solution:
(a) : During muscle contraction, the 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 foward 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 the whole muscle.

Question31

Glenoid cavity articulates (2015 Cancelled)

Options:

A. clavicle with scapula

B. humerus with scapula

C. clavicle with acromion

D. scapula with acromion

Answer: B

Solution:

(b) : Upper rounded end of the humerus (bone of arm) is called head that articulates into the glenoid cavity of the pectoral girdle (shoulder girdle) of scapula or shoulder blade bone.

Question32

Select the correct matching of the type of the joint with the example in human skeletal system.

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

(2014)

Options:

A. (a)

B. (b)

C. (c)

D. (d)

Answer: D

Solution:

Solution:
(d) : Cartilaginous - Between the adjacent joint vertebrae in vertebral column
Pivot joint - Between atlas and axis
Hinge joint - Knee joint
Ball and - Between head of socket joint humerus and glenoid cavity of pectoral girdle
Fibrous joint - Between frontal and parietal bones of skull (sutures)

Question33

Select the correct statement with respect to locomotion in humans. (NEET 2013)

Options:

A. The vertebral column has 10 thoracic vertebrae.

B. The joint between adjacent vertebrae is a fibrous joint.

C. A decreased level of progesterone causes osteoporosis in old people.

D. Accumulation of uric acid crystals in joints causes their inflammation

Answer: D

Solution:

Solution:
(d) : Thoracic vertebrae are 12 in numbers. Joints between adjacent vertebrae are cartilagenous joints and the opposing surfaces are connected by fibrocartilage which allows very little movement. Osteoporosis is a disease characterised by low bone mass and loss of bone tissue that may lead to weak and fragile bones. Osteoporosis occurs when there is an imbalance between new bone formation and old bone resorption. Generalised osteoporosis is common in elderly people and in women following menopause. In osteoporosis, the osteoblastic (bone forming) activity in the bone usually is less than normal and consequently the rate of bone deposition is depressed. Estrogens inhibit osteoclastic (bone resorption) activity in the bones and therefore stimulate bone growth. After menopause, almost no estrogens are secreted by ovaries. This estrogen deficiency leads to increased osteoclastic activity in the bones, decreased bone matrix and decreased deposition of bone calcium and phosphate. In some women, this effect result in osteoporosis.

Question34

The H-zone in the skeletal muscle fibre is due to (NEET 2013)

Options:

A. the central gap between actin filaments extending through myosin filaments in the A-band

B. extension of myosin filaments in the central portion of the A -band

C. the absence of myofibrils in the central portion of A-band

D. the central gap between myosin filaments in the A-band

Answer: A

Solution:

Solution:
(a) : Each muscle fibre has many parallelly arranged myofibrils. Each myofibril contains many serially arranged units called sarcomere which are the functional units. Each sarcomere has a central 'A' band made of thick myosin filaments and two half 'I' bands made of thin actin filaments on either side of it marked by 'Z' lines. In a resting state, the edges of thin filaments on either side of the thick filaments partially overlap the free ends of the thick filaments leaving the central part of the thick filaments. This central part of thick filament, not overlapped by thin filaments is called the 'H' zone.

Question35

The characteristic and an example of a synovial joint in humans is

	Characteristics	Examples
(a)	Fluid filled synovial cavity between two bones	Joint between atlas and axis
(b)	Lymph filled between two bones, limited movement	Gliding joint between carpals
(c)	Fluid cartilage between two bones, limited movements	Knee joint
(d)	Fluid filled between two joints, provides cushion	Skull bones

(NEET 2013)

Options:

A. (a)

B. (b)

C. (c)

D. (d)

Answer: A

Solution:

(a) : Joint between atlas and axis is a pivot joint, a type of synovial joint. Synovial joints are characterised by presence of fluid filled cavity between the articulating surface of the two bones.

Question36

During muscle contraction in humans, the (KN NEET 2013)

Options:

A. sarcomere does not shorten

B. A band remains same

C. A, H and I bands shorten

D. actin filaments shorten

Answer: B

Solution:

(b) : According to sliding-filament theory of muscle contraction, the actin and myosin filaments slide past each other with the help of cross-bridge to reduce the length of the sarcomeres. The smallest unit of muscle contraction is a sarcomere

(which is delineated by Z-lines). As a muscle contracts, the Z lines come closer together (shortening sarcomere), the width of the I bands decreases, the width of the H zones decreases, but there is no change in the width of the A band. During relaxation, cross-bridges disappear and actin filaments slide back from A-bands, the width of the I bands and H zones increases, but there is still no change in the width of the A band.

Question37

Select the correct statement with respect to disorders of muscles in humans.
(KN NEET 2013)

Options:

A. Failure of neuromuscular transmission in myasthenia gravis can prevent normal swallowing.

B. Accumulation of urea and creatine in the joints causes their inflammation.

C. An overdose of vitamin D causes osteoporosis.

D. Rapid contractions of skeletal muscles cause muscle dystrophy

Answer: A

Solution:

Solution:
(a) : Myasthenia gravis is an autoimmune disorder in which autoantibodies bind to cholinergic receptors on muscle cells and impairs the ability of the neurotransmitter acetylcholine to induce muscular contraction. This leads to fatigue, weakening and paralysis of skeletal muscles of mouth and throat which may prevent normal swallowing. Gouty arthritis is caused either due to excessive formation of uric acid or inability to excrete it. It gets deposited in synovial joints and causes inflammation. Osteoporosis is a disease in which bone loses minerals and fibres from its matrix. Major causative factors of osteoporosis are imbalances of hormones like calcitonin of thyroid, parathormone of parathyroids, sex hormones and deficiencies of calcium and vitamin D. Muscular dystrophy is inborn abnormality of muscles associated with dysfunction and ultimately with deterioration.

Question38

Select the correct statement regarding the specific disorder of muscular or skeletal system.
(2012)

Options:

A. Muscular dystrophy - Age related shortening of muscles

B. Osteoporosis - Decrease in bone mass and higher chances of fractures with advancing age

C. Myasthenia gravis - Autoimmune disorder which inhibits sliding of myosin filaments

D. Gout - Inflammation of joints due to extra deposition of calcium

Answer: B

Solution:

(b) : Muscular dystrophy is characterised by progressive skeletal muscle weakness, defects in muscle proteins and the death of muscle cells and tissue.
Myasthenia gravis is an auto-immune neuromuscular disease in which muscle becomes weak, which is caused by circulating antibodies that block acetylcholine receptors at the postsynaptic neuromuscular junction inhibiting the excitatory effects of the acetylcholine. Gout is inflammation of joints which is caused by elevated levels of uric acid in the blood which crystallises and the crystals are deposited in joints, tendons and surrounding tissues.

Question39

Which one of the following pairs of chemical substances, is correctly categorised?
(2012)

Options:

A. Calcitonin and thymosin - Thyroid hormones

B. Pepsin and prolactin - Two digestive enzymes secreted in stomach

C. Troponin and myosin Complex proteins in striated muscles

D. Secretin and rhodopsin - Polypeptide hormones

Answer: C

Solution:

Solution:
(c) : Skeletal muscle fibres occur in bundles and are normally attached to the skeleton. Each muscle fibre is an elongated cell surrounded externally by a delicate membrane, the sarcolemma. Just beneath the sarcolemma in each fibre many nuclei occur at irregular intervals. Thus, these fibres are multinucleated or syncytial in nature. The cytoplasm of each fibre (sarcoplasm) has a large number of myofibrils which are tightly packed. Each myofibril shows dark bands (A bands) containing myosin and light band (I bands) containing actin, alternating with each other. That is why these are named as striped muscle fibres. Actin filaments are thinner as compared to the myosin filaments. Each actin filament is made of two 'F' actins helically wound to each other. Each 'F' actin is a polymer of monomeric 'G' (globular) actins. Two filaments of another protein, tropomyosin also run close to the 'F' actins throughout its length. A complex protein troponin is distributed at regular intervals on the tropomyosin. In the resting state a subunit of troponin masks the active binding sites for myosin on the actin filaments. Each myosin filament is also a polymerised protein made up of many monomeric proteins called meromyosins.

Question40

The type of muscle present in our
(2011)

Options:

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

Answer: C

Solution:

Solution:
(c) : 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.

Question41

Three of the following pairs of the human skeletal parts are correctly matched with their respective inclusive skeletal category and one pair is not matched. Identify the non-matching pair.

	Pair of skeletal parts	Category
(a)	Sternum and ribs	Axial skeleton
(b)	Clavicle and glenoid cavity	Pelvic girdle
(c)	Humerus and ulna	Appendicular skeleton
(d)	Malleus and stapes	Ear ossicles

(2011)

Options:

A. (a)

B. (b)

C. (c)

D. (d)

Answer: B

Solution:

(b) : Each pectoral girdle consists of two bones, clavicle and scapula. The scapula (shoulder blade) consists of a sharp ridge, the spine and a triangular body. The end of the spine projects as a flattened and expanded process called acromion. This process articulates with the clavicle. At the lateral end of the superior of the scapula is projection of the anterior surface called the coracoid process, to which the tendons of the muscles attach. At the point where the superior and lateral borders of the scapula meet there is the lateral angle which presents a shallow articular surface termed as glenoid cavity into which the head of the humer is articulated.

Question42

Which one of the following is the correct description of a certain part of a normal human skeleton?
(2010)

Options:

A. Parietal bone and the temporal bone of the skull are joined fibrous joint.

B. First vertebra is axis which articulates with the occipital condyles.

C. The 9^{th} and 10^{th} pairs of ribs are called the floating ribs.

D. Glenoid cavity is a depression to which the thigh bone articulates

Answer: A

Solution:

Solution:
(a) : The bones of skulls are joined by white fibrous tissue which sustain no movement between the skull bones. This kind of joint is classified as fibrous or immovable joints. Thus, parietal and temporal bone of the skull are joined by fibrous joints. First cervical vertebra, atlas, joins the second cervical vertebra axis to form a joint (pivot joint) which allows movement in one plane. The atlas supports the head and allows movement of head over neck.
The last two pairs of ribs are called floating ribs because their anterior ends are not attached to either the sternum or the cartilage of anterior rib. Glenoid cavity is a depression to which humerus articulates.

Question43

Which one of the following is the correct matching of three items and their grouping category?

	Items	Group
(a)	Ilium, ischium, pubis	Coxal bones of pelvic girdle
(b)	Actin, myosin, rhodopsin,	Muscle proteins
(c)	Cytosine, uracil, thiamine	Pyrimidines
(d)	Malleus, incus,cochlea	Ear ossicles

(2009)

Options:

A. (a)

B. (b)

C. (c)

D. (d)

Answer: A

Solution:

Ilium, ischium and pubis are parts of coxal bones of pelvic girdle.
Thiamine is vitamin and thymine, cytosine and uracil are pyrimidines.
Malleus, incus and stapes are ear ossicles. Cochlea is not ear ossicles but it is the part of the inner ear involved in hearing.
Actin and myosin are muscle proteins while rhodopsin is protein present in rods of eye.

Question44

Elbow joint is an example of (2009)

Options:

A. hinge joint

B. gliding joint

C. ball and socket joint

D. pivot joint

Answer: A

Solution:

(a) : Hinge joint is a form of diarthrosis (freely movable joint) that allows angular movement in one plane only, increasing or decreasing the angle between the bones. Examples are - knee joint and elbow joint.

Question45

Which one of the following items gives its correct total number? (2007)

Options:

A. Types of diabetes-3

B. Cervical vertebrae in humans- 8

C. Floating ribs in humans-4

D. Amino acids found in proteins-16

Answer: C

Solution:

Solution:
(c) : There are twelve pairs of ribs which form the bony lateral walls of the thoracic cage. The first seven pairs are called true ribs; eight, ninth and tenth pairs are called false ribs. The last two pairs of ribs are called floating ribs because their anterior ends are not attached either to the sternum or the cartilage of another rib. The floating ribs protect the kidneys.

Question46

In human body, which one of the following is anatomically correct? (2007)

Options:

A. Collar bones -3 pairs

B. Salivary glands -1 pair

C. Cranial nerves -10 pairs

D. Floating ribs- 2 pairs

Answer: D

Solution:

(d) : Collar bones (Clavicle) - 2 pairs
Salivary glands - 3 pairs
Cranial nerves - 12 pairs

Question47

The contractile protein of skeletal muscle involving ATPase activity is (2006)

Options:

A. troponin

B. tropomyosin

C. myosin

D. α-actinin

Answer: C

Solution:

Solution:
(c) : Myosin is a contractile protein that interacts with actin to bring about contraction of muscle or cell movement. The type of myosin molecule found in muscle fibres consists of a tail, by which it aggregates with other myosin molecules to form socalled thick filaments and a globular head, which has sites for the attachment of actin and ATP molecule. Troponin, tropomyosin and a-actinin are the actin in the thin filament.

Question48

An acromian process is characteristically found in the (2005)

Options:

A. pelvic girdle of mammals

B. pectoral girdle of mammais

C. skull of frog

D. sperm of mammals

Answer: B

Solution:

(b) : Each half of pectoral girdle is made up of two bones scapula and clavicle. At the outer angle of scapula is a shallow

socket known as glenoid cavity into which fits head of humerus bone to form a shoulder joint. Above glenoid cavity project two processes - acromion process and coracoid process. Acromion process extends over the glenoid cavity and articulates with clavicle to form shoulder girdle. Coracoid process is like a hook and is smaller than acromion process.

Question49

Which of the following pairs is correctly matched? (2005)

Options:

A. Hinge joint Between vertebrae

B. Gliding joint - Between zygapophyses of the successive vertebrae

C. Cartilaginous joint - Skull bones

D. Fibrous joint Between phalanges

Answer: B

Solution:

Solution:
(b) : Gliding joint permits sliding movements of two bones over each other. Hinge joint allows movements in one plane only. Knee joint, elbow joint, ankle joint are of this type. Cartilaginous joint is a slightly movable joint and is found between the centre of vertebrae, at the pubic symphysis and between ribs and sternum. Fibrous joint is an immovable joint which occur between the bones of cranium.

Question50

What will happen if ligaments are torn? (2002)

Options:

A. Bones will move freely at joint and no pain.

B. Bone less movable at joint and pain.

C. Bone will become unfixed.

D. Bone will become fixed

Answer: B

Solution:

(b) : Ligaments join a bone with another bone in movable/synovial joints. Torn ligaments make movement at joints very painful and restricted.

Question51

Which cartilage is present at the end of long bones? (2002)

Options:

A. Calcified cartilage

B. Hyaline cartilage

C. Elastic cartilage

D. Fibrous cartilage

Answer: B

Solution:

Solution:
(b) : Cartilage is an important component of skeleton. It consists of a firm matrix containing collagen and elastin fibres and cells in fluid-filled lacunae. Cartilage has many types. Elastic cartilage occurs in the pinna and external auditory canal of the ear, epiglottis, Eustachian tubes and tip of the nose to make these organs flexible. Fibrous cartilage is very strong yet has a degree of flexibility. It is found in the intervertebral discs where it acts as a cushion and in pubic symphysis where it allows parturition without damage to the girdle. Hyaline cartilage occurs in sternal ribs where it allows expansion of chest during inspiration. It also forms the tracheal and bronchial rings and supports larynx and nasal septum and also at the end of long bones.

Question52

Which statement is correct for muscle contraction? (2001)

Options:

A. Length of H-zone decreases

B. Length of A-band remains constant

C. Length of I-band increases

D. Length of two Z-line increases

Answer: B

Solution:

Hint: Muscle contraction is the activation of tension-producing areas inside muscle fibers. Muscular contraction doesn't necessarily mean muscle shortening because muscle tension is often produced without changes in muscle length, like when holding an important book or a dumbbell in the same position.

Complete answer:
While contraction, the skinny filaments drop above the thick filaments. A signal sent by the central nervous system via motor nerve fibre initiates muscular contraction. When Calcium ions combine with troponin then in consequence muscle contraction will initiate. While contraction, the Z-lines come closer together and the sarcomere becomes smaller. The length of the A-band remains constant. I-bands shorten and H-zone narrows. The termination of muscle contraction is obeyed by muscle relaxation, which is a restoration of the muscle fibers to their low tension-producing state.
Additional Information: Muscle contraction takes place in the following steps.
-Nerve impulse goes through a motor nerve to its end sites on muscle fibers.
-A little amount of acetylcholine (neurotransmitter) is secret on the fiber from the nerve end.
-The membranes of muscle fibers open up. The action of acetylcholine.
-The sodium ions go within the membrane by this opening.
-The sodium channels also get opened.
-This initiated action potential inside the membrane.
-The action potential runs along with the muscle fiber.
-Due to the present action potential the sarcoplasm releases the calcium ion
-The calcium ions end in attractive forces between actin and myosin filaments of muscles that cause contractions.

Question53

What is sarcomere?
(2001)

Options:

A. Part between two H-line

B. Part between two A-line

C. Part between two I-band

D. Part between two Z-line

Answer: D

Solution:

Solution:
(d) : A striated muscle fibre is bounded by sarcolemma. It shows alternating dark and light cross bands, the striations. Dark band is called A band which has at its middle a light zone termed H zone. Light band is known as I band which is crossed through its centre by a dark membrane called Z line. The part of the muscle fibre between two successive Z lines functions as a contractile unit called sarcomere.

Question54

Sternum is connected to ribs by
(2000)

Options:

A. bony matter

B. white fibrous cartilage

C. hyaline cartilage

D. areolar tissue

Answer: C

Solution:

Solution:
(c) : Sternum is connected to ribs by hyaline cartilage (= giving a shiny glass like appearance and gives flexibility and support at the joints). Sternum is also called breast bone. It is a narrow, elongated and flattened structure, present just under the skin in the middle of front of the chest. It consists of three parts - manubrium, mesosternum and xiphoid process. Manubrium is the thickest, strongest part and articulates with the clavicle of pectoral girdle and first pair of ribs. Mesosternum provide articulation to second to sixth pairs of ribs and xiphoid process (also called metasternum) articulates with seventh pair of ribs in association with mesosternum.

Question55

Bone related with skull is (2000)

Options:

A. coracoid

B. arytenoid

C. pterygoid

D. atlas

Answer: C

Solution:

Solution:
(c) : Pterygoid is a process that extends from sphenoid bone of skull to form a plate like structure. Above the glenoid cavity of scapula is present two processes - acromion and coracoid. Coracoid process is like a hook and is smaller that acromion process projecting upwards. Atlas is first cervical vertebra. Arytenoid is a cartilage that forms part of larynx.

Question56

What is the name of joint between ribs and sternum? (2000)

Options:

A. Cartilaginous joint

B. Angular joint

C. Gliding joint

D. Fibrous joint

Answer: A

Solution:

(a) : Cartilaginous joint is present between ribs and sternum. It allows only limited movement. An angular joint allows movement in two directions side to side and back and forth. Wrist and metacarpophalangeal joints are of this type. Gliding joint permits sliding movements of two bones over each other, e.g., joints between sternum and clavicles. Fibrous joints do not allow movement and are present between the bones of cranium.

Question57

The joint between atlas and axis is called (1999)

Options:

A. angular joint

B. hinge joint

C. pivot joint

D. saddle joint

Answer: C

Solution:

Solution:
(c) : Pivot joint is present between atlas and the axis in humans. In this joint articular end of one bone is fixed while the other can rotate over it. In angular joint, an oval condyle of one bone fits into an elliptical concavity of the other, e.g., wrist and metacarpophalangeal joints. Hinge joint allows movements in one plane only, e.g., knee joint. In saddle joint, small projection of one bone fits into a saddle like depression of another bone.

Question58

Which of the following is the contractile protein of a muscle? (1998)

Options:

A. Tropomyosin

B. Tubulin

C. Myosin

D. All of these

Answer: C

Solution:

Solution:
(c) : Myosin is a contractile protein of muscle. Primary myofilaments are made ap of this protein. Each myosin filament is a polymerised protein made of many monomeric protein called meromyosins. Secondary myofilaments are composed of a protein actin, having with it two regulatory proteins: tropomyosin and troponin. Myosin interacts with actin to bring about contraction of muscle or cell movement. Tubulin is a protein of which the microtubules of cells are formed.

Question59

The functional unit of contractile system in striated muscle is (1998)

Options:

A. sarcomere

B. Z-band

C. cross bridges

D. myofibril

Answer: A

Solution:

Solution:
(a) : A striated muscle fibre is bounded by sarcolemma. It shows alternating dark and light cross bands, the striations. Dark band is called A band which has at its middle a light zone termed H zone. Light band is known as I band which is crossed through its centre by a dark membrane called Z line. The part of the muscle fibre between two successive Z lines functions as a contractile unit called sarcomere.

Question60

Total number of bones in each limb of a man is (1998)

Options:

A. 24

B. 30

C. 14

D. 21

Answer: B

Solution:

Each arm and each leg contains 30 bones. Flexors work antagonistically with extensors. E.g. each arm contains humerus in the upper arm, radius and ulna in the forearm, 8 carpals in the wrist, 5 metacarpals in the palm and 14 phalanges in the fingers. Each hind limb contains femur in thigh, patella in knee, tibia and fibula in shank, 7 tarsals in ankle, 5 metatarsals in sole and 14 phalanges in toes.

Question61

When a muscle bends one part upon the other, it is called (1996)

Options:

A. abductor

B. regulator

C. extremor

D. flexor

Answer: D

Solution:

Solution:
(d) : Flexor muscle bends one part of a limb on another at a joint, e.g., biceps. It brings the fore arm towards the upper arm. Flexor work antagonistically with extensors. Abductor (levator) is a type of muscle whose function is to move a limb away from the body.
E.g., deltoides of shoulder.

Question62

The number of floating ribs in the human body is (1995)

Options:

A. 3 pairs

B. 2 pairs

C. 6 pairs

D. 5 pairs

Answer: B

Solution:

(b) : There are twelve pairs of ribs which form the bony lateral walls of the thoracic cage. The first seven pairs are called true ribs; eight, ninth and tenth pairs are called false ribs. The last two pairs of ribs are called floating ribs because their anterior ends are not attached either to the sternum or the cartilage of another rib. The floating ribs protect the kidneys.

Question63

Which of the following components is a part of the pectoral girdle? (1994)

Options:

A. Sternum

B. Acetabulum

C. Glenoid cavity

D. Ilium

Answer: C

Solution:

Solution:
(c) : The pectoral girdle lies on the posterolateral aspect of the upper region of the thorax. It consists of 2 bones : scapula and clavicle. The scapula, also called shoulder blade, is a large, flat, triangular bone placed at the back of the shoulder. It has at its lateral angle a shallow concavity, the glenoid cavity, for the articulation of the head of the humerus. Acetabulum and ilium are parts of pelvic girdle. Sternum is a long, narrow, flat vertical bone in the middle of the front wall of the chest.

Question64

The type of joint between the human skull bones is called (1994)

Options:

A. cartilaginous joint

B. hinge joint

C. fibrous joint

D. synovial joint

Answer: C

Solution:

(c) : Fibrous joint is present between the human skull bones. It does not allow movement because the bones are held firmly together by bundles of strong white collagen fibres. Cartilaginous joints are present between the centra of vertebrae, at the pubic symphysis and between ribs and sternum. Knee joint, elbow joint and ankle joint are types of hinge joint. Synovial joint occurs between limb and bones.

Question65

The cervical vertebrae in human is (1993)

Options:

A. same as in whale

B. more than that in rabbit

C. double than that of horse

D. less than that in giraffe

Answer: A

Solution:

(a) : The number of cervical vertebrae are same in man and whale that is 7 in number.

Question66

Long bones function in (1993)

Options:

A. support

B. support, erythrocyte and leucocyte synthesis

C. support and erythrocyte synthesis

D. erythrocyte formation

Answer: B

Solution:

(b) : Long bones strengthen the legs and arms, provide support and also synthesise erythrocytes and leucocytes due to presence of bone marrow in their cavities.

Question67

Number of cervical vertebrae in camel is (1993)

Options:

A. more than that of rabbit

B. less than that of rabbit

C. same as that of whale

D. more than that of horse

Answer: C

Solution:

Solution:
(c) : The vast majority of mammals have seven cervical vertebrae (neck bones), including camel, bats, giraffes, whales and humans. The few exceptions include the manatee and the two-toed sloth, which each have only six cervical vertebrae and the three toed sloth with nine cervical vertebrae.

Question68

A deltoid ridge occurs in (1990)

Options:

A. radius

B. ulna

C. femur

D. humerus

Answer: D

Solution:

(d) : In the humerus bone, pectoral and deltoid ridges are important points of muscle attachment.

Question69

Extremities of long bones possess which of the following cartilages? (1989)

Options:

A. Calcified

B. Fibrous

C. Elastic

D. Hyaline

Answer: D

Solution:

(d) : Hyaline cartilage has a clear, homogeneous, translucent, bluish-green matrix. It often contains a good number of very fine collagen fibres, which are difficult to observe. This cartilage is flexible, elastic and compressible. It is found in the sternal ribs, extremities of leg bones, tracheal and bronchial rings, laryngeal wall, nasal septum and superscapula. Elastic cartilage is found in the pinna, epiglottis, Eustachian tubes and tip of nose. Calcified cartilage is found in the suprascapula of frog. Fibrous cartilage is found in the intervertebral discs and pubic symphysis.

Question70

Intercostal muscles occur in (1988)

Options:

A. abdomen

B. thigh

C. ribs

D. diaphragm

Answer: C

Solution:

(c) : Intercostal muscles (external intercostal and internal intercostal) are attached with the ribs which help in the movement of rib cage during breathing.
