1. Look at the following sets of bones and the type of joints, and select the correct combination of the two sets

(i) Atlas and Axis	(p) Cartilaginous joint
(ii) Two Parietals	(q) Fibrous joint
(iii) Two pubis bones	(r) Saddle joint
(iv) First carpal and first metacarpal	(s) Pivot joint

(a) (i-q) (ii-p) (b) (ii-q) (iii-r)
(c) (iii-q) (iv-r) (d) (iv-r) (i-s)

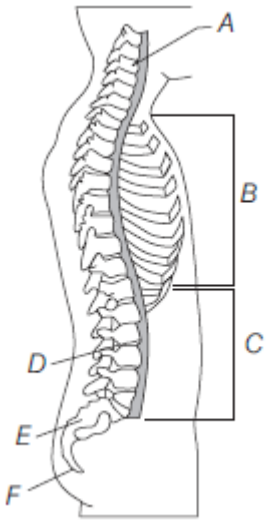
2. In which of the following processes, flagellar movements are involved?
(a) Swimming of spermatozoa
(b) Maintenance of water current in spongocoel of sponges
(c) Locomotion in *Euglena*
(d) All of the above

3. Actin and myosin filaments of muscles are also called
(a) thick and thin filaments, respectively
(b) thin and thick filaments, respectively
(c) black and white filaments, respectively
(d) white and black filaments, respectively

4. Mechanism of muscle contraction is best explained by
(a) physical filament theory
(b) chemical filament theory
(c) sliding filament theory
(d) jumping filament theory

5. Hardness of the bones is due to
(a) hard matrix made up of calcium salts
(b) hard matrix made up of phosphates
(c) hard matrix made up of sodium salts
(d) hard matrix made up of chelates

6. Examine the figure of vertebral column (right lateral view) and identify *A*, *B*, *C*, *D*, *E* and *F*.



	A	B	C	D	E	F
(a)	Lumbar vertebrae	Thoracic vertebrae	Cervical vertebrae	Intervertebral disc	Sacrum	Coccyx
(b)	Cervical vertebrae	Thoracic vertebrae	Lumbar vertebrae	Intervertebral disc	Sacrum	Coccyx
(c)	Thoracic vertebrae	Cervical vertebrae	Intervertebral disc	Lumbar vertebrae	Coccyx	Sacrum
(d)	Cervical vertebrae	Thoracic vertebrae	Lumbar vertebrae	Intervertebral disc	Coccyx	Sacrum

7. Bones of the limbs along with their girdles constitute the
(a) apendicular skeleton (b) axial skeleton

(c) apex skeleton (d) axis skeleton

8. Cavity in coxal bone called acetabulum is formed by the fusion of
(a) ilium and incus (b) ilium and ischium
(c) incus and ischium (d) ilium, ischium and pubis

9. The cartilaginous joints contain
(a) hyaline cartilage (b) fibrous cartilage
(c) Both (a) and (b) (d) Either (a) or (b)

10. Osteoporosis is
(a) an age-related disorder
(b) a gene related disorder
(c) a result of low Ca^{2+} ions in body
(d) None of the above

11. Gout is caused due to the accumulation of
(a) glucose (b) uric acid crystals
(c) bile (d) ammonia

12. ATPase of the muscle is located in
(a) actinin (b) troponin
(c) myosin (d) actin

13. Which one of the following pair is incorrect?
(a) Hinge joint – between humerus and pectoral girdle
(b) Pivot joint – between atlas, axis and occipital condyle
(c) Gliding joint – between the carpals
(d) Saddle joint – between carpals and metacarpal of thumb

14. Which one of the following statements is incorrect?
(a) Heart muscles are striated and involuntary
(b) The muscles of hands and legs are striated and voluntary
(c) The muscles located in the inner walls of alimentary canal are striated and involuntary
(d) Muscles located in the reproductive tracts are unstriated and involuntary

15. Match the following columns.

	Column I		Column II
A.	Sternum	1.	Synovial fluid
B.	Glenoid cavity	2.	Vertebrae
C.	Freely movable joint	3.	Pectoral girdle
D.	Cartilaginous joint	4.	Flat bone

Codes

	A	B	C	D		A	B	C	D
(a)	2	1	3	4	(b)	4	3	1	2
(c)	2	1	4	3	(d)	4	1	2	3

16. Between humerus and pectoral girdle which type of joint is present :-

(a) Pivot joint
(b) Hinge joint
(c) Ball & socket joints
(d) Gliding joints

17. Pelvic girdle of man consists of :-

(a) Ilium, ischium and pubis
(b) Ilium, ischium and coracoid
(c) Coracoid, scapula and clavicle
(d) Ilium, coracoid and scapula

18. Hinge joint is present between :-

(a) Femur and ulna
(b) Humerus and ulna
(c) Femur and pectoral girdle
(d) Femur and pelvic girdle

19. Cranium of man is made up of

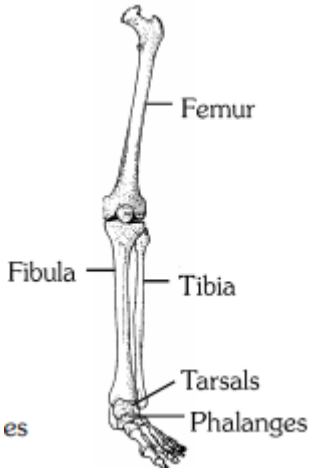
(a) 8 bones
(b) 12 bones
(c) 16 bones
(d) 14 bones

20. How many bones are present in human skull ?

(a) 32
(b) 28
(c) 12
(d) 42

21. Given below is a diagram of the bones of the left human hindlimb as seen from front. It has certain mistakes in labeling. Two of the wrongly labelled bones are :-

(a) Tibia and tarsals
(b) Femur and fibula
(c) Fibula and phalanges
(d) Tarsals and femur



22. Sliding filament theory can be best explained as

(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. (2015cancelled)

23. Select the correct option.

(a) There are seven pairs of vertebrosternal, three pairs of vertebrochondral and two pairs of vertebral ribs.
(b) 8th, 9th and 10th pairs of ribs articulate directly with the sternum.
(c) 11th and 12th pairs of ribs are connected to the sternum with the help of hyaline cartilage.
(d) Each rib is a flat thin bone and all the ribs are connected dorsally to the thoracic vertebrae and ventrally to the sternum. (NEET 2019)

24. Which one of the following items gives its correct total number?

(a) Types of diabetes-3
(b) Cervical vertebrae in humans-8
(c) Floating ribs in humans-4
(d) Amino acids found in proteins-16 (2007)

25. The number of floating ribs in the human body is

(a) 3 pairs
(b) 2 pairs
(c) 6 pairs
(d) 5 pairs. (1995)

26. Number of cervical vertebrae in camel is

(a) more than that of rabbit
(b) less than that of rabbit
(c) same as that of whale
(d) more than that of horse. (1993)

27. 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)

28. What is the name of joint between ribs and sternum?
(a) Cartilaginous joint
(b) Angular joint
(c) Gliding joint
(d) Fibrous joint (2000)

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

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

1. (d)

2. (d)
3. (b)
4. (c)
5. (a)
6. (b)
7. (*a*) Bones of the limbs along with their girdles constitute the appendicular skeleton. It consists of 126 bones.
8. (*d*) Cavity in coxal bone called acetabulum is formed at the site of fusion of ilium, ischium and pubis.

9. (*d*) The cartilaginous joints either contain hyaline cartilage, e.g. in between ribs and sternum or fibrous cartilage, e.g. in pubic symphysis.

10. (*a*) Osteoporosis is an age-related disorder characterized by decreased bone mass as bones loose minerals and fibres from the matrix causing decreased bone mass and increased chances of fractures. Decreased level of oestrogen is a common cause of this disease.

11. (b)
12. (*c*) ATPase of muscles is located in myosin. The globular head of myosin in muscles contains the active ATPase enzyme having binding sites for ATP and active sites for actin.

13. (*a*) The pair in option (a) is incorrect. It can be corrected as Hinge joint is found in knees, elbows, etc. Ball and socket joint is found between humerus and pectoral girdle. Rest of the pairs are correctly matched.

14. (*c*) Statement in option (c) is incorrect. It can be corrected as The visceral or smooth muscles located in the inner walls of alimentary canal are non-striated and involuntary in nature. Rest of the statements are correct.

15. (b)
16. (c)
17. (a)
18. (b)
19. (a)
20. (b)
21. (c)

22. (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 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 the whole muscle.

23. (a) : Ribs 1-7 are classified as true ribs (vertebrosternal ribs), ribs 8-10 are false ribs (vertebrochondral ribs) and ribs 11 and 12 are floating ribs (vertebral ribs).

24. (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; eighth, 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 to the cartilage of another rib. The floating ribs protect the kidneys.

25. (b)

26. (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, both have only six cervical vertebrae and the three-toed sloth with nine cervical vertebrae.

27. (d): Cartilaginousjoint – Between the adjacent vertebrae in vertebral column
Pivot joint – Between atlas and axis
Hinge joint – Knee joint
Ball andsocket joint – Between head of humerus and glenoid cavity of pectoral girdle
Fibrous joint – Between frontal and parietal bones of skull (sutures)

28. (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.

29. (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 level in blood plasma are much reduced. Estrogen helps to regulate bone cells called osteoclasts which are responsible for building new bone. When estrogen level drop fewer osteoclasts are produced resulting in osteoporosis.

30. (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.