



7 Structural Organisation in Animals

7.2. Frogs

1. Select the correct route for the passage of sperms in male frogs.

- (A) Testes → Bidder's canal → Kidney → Vasa efferentia → Urinogenital duct → Cloaca
- (B) Testes → Vasa efferentia → Kidney → Seminal vesicle → Urinogenital duct → Cloaca
- (C) Testes → Vasa efferentia → Bidder's canal → Ureter → Cloaca
- (D) Testes → Vasa efferentia → Kidney → Bidder's canal → Urinogenital duct → Cloaca [NEET 2017]

2. Frog's heart when taken out of the body continues to beat for some time.

Select the best option from the following statements.

- (I) Frog is a poikilotherm.
- (II) Frog does not have any coronary circulation.
- (III) Heart is "myogenic" in nature.
- (IV) Heart is auto excitable.

Options:

(A) Only (III)	(B) Only (IV)
(C) (I) and (II)	(D) (III) and (IV)

[NEET 2017]

3. Compared to those of humans, the erythrocytes in frog are:

- (A) without nucleus but with haemoglobin
- (B) nucleated and with haemoglobin
- (C) very much smaller and fewer
- (D) nucleated and without haemoglobin. [AIPMT 2012]

4. Frogs differ from humans in possessing:

- (A) paired cerebral hemispheres
- (B) hepatic portal system
- (C) nucleated red blood cells
- (D) thyroid as well as parathyroid.

[AIPMT Mains 2011]

5. Consider the following four statements (I-IV) related to the common frog *Rana tigrina*, and select the correct option stating which ones are true (T) and which ones are false (F).

- (I) On dry land it would die if its mouth is forcibly kept closed for a few days.

- (II) It has four-chambered heart.

- (III) On dry land it turns uricotelic from ureotelic.

- (IV) Its life-history is carried out in pond water.

(I)	(II)	(III)	(IV)
(A) T	F	F	T
(B) T	T	F	F
(C) F	F	T	T
(D) F	T	T	F

[AIPMT Mains 2011]

6. Ureters act as urogenital ducts in:

- (A) human males
- (B) human females
- (C) frog's both male and female
- (D) male frogs.

[AIPMT Mains 2011]

7. Mucus helps frog in forming:

(A) thick skin	(B) dry skin
(C) smooth skin	(D) moist skin [AIPMT 1993]

8. Bull Frog of India is:

(A) <i>Rana tigrina</i>	(B) <i>R. sylvatica</i>
(C) <i>R. ecutesbeiana</i>	(D) <i>R. esculenta</i> .

[AIPMT 1992]

9. Skin is a respiratory organ in:

(A) lizards	(B) birds
(C) primitive mammals	(D) frog [AIPMT 1990]

*7.3. Animal Tissues

10. Which of the following statements is correct about the type of junction and their role in our body?

- (A) Adhering junctions facilitate the cells to communicate with each other.
- (B) Tight junctions help to stop substances from leaking across a tissue.
- (C) Tight junctions help to perform cementing to keep neighbouring cells together.
- (D) Gap junctions help to create gap between the cells and tissues. [Re-NEET 2024]

Choose the correct answer from the options given:

(a) (b) (c) (d)
(A) (i) (ii) (iii) (iv)
(B) (ii) (i) (iv) (iii)
(C) (iii) (iv) (ii) (i)
(D) (iv) (iii) (i) (ii)

[NEET 2022]

18. Which of the following is present between the adjacent bones of the vertebral column?

(A) Cartilage (B) Areolar tissue
(C) Smooth muscle (D) Intercalated discs

[NEET 2022]

19. Which of the following is not a connective tissue?

(A) Adipose tissue (B) Cartilage
(C) Neuroglia (D) Blood [NEET 2022]

20. Which of the following statements wrongly represents the nature of smooth muscle?

(A) These muscle have no striations.
(B) They are involuntary muscles.
(C) Communication among the cells is performed by intercalated discs.
(D) These muscles are present in the wall of blood vessels.

[NEET 2021]

21. Identify the types of cell junctions that help to stop the leakage of the substances across a tissue and facilitation of communication with neighbouring cells via rapid transfer of ions and molecules.

(A) Gap junctions and Adhering junctions, respectively
(B) Tight junctions and Gap junctions, respectively
(C) Adhering junctions and Tight junctions, respectively
(D) Adhering junctions and Gap junctions, respectively

[NEET 2021]

22. Select the incorrectly matched pair from following.

(A) Chondrocytes-Smooth muscle cells
(B) Neurons-Nerve cells
(C) Fibroblast-Areolar tissue
(D) Osteocytes-Bone cells [NEET Oct. 2020]

23. Goblet cells of alimentary canal are modified from:

(A) columnar epithelial cells
(B) chondrocytes
(C) compound epithelial cells
(D) squamous epithelial cells. [NEET Sept. 2020]

24. Cuboidal epithelium with brush border of microvilli is found in:

(A) ducts of salivary gland
(B) proximal convoluted tubule of nephron
(C) eustachian tube
(D) lining of intestine. [NEET 2020]

25. The ciliated epithelial cells are required to move particles or mucus in a specific direction. In humans, these cells are mainly present in:
(A) fallopian tubes and pancreatic duct
(B) eustachian tube and salivary duct
(C) bronchioles and fallopian tubes
(D) bile duct and bronchioles.

[NEET National 2019, AIPMT Screening 2011]

26. Match the following cell structures with their characteristic features.

Column I	Column II
(a) Tight junctions	(i) Cement neighbouring cells together to form sheet.
(b) Adhering junctions	(ii) Transmit information through chemical to another cells.
(c) Gap junctions	(iii) Establish a barrier to prevent leakage of fluid across epithelial cells.
(d) Synaptic junctions	(iv) Cytoplasmic channels to facilitate communication between adjacent cells.

Select the correct option from the following.

(a) (b) (c) (d)
(A) (ii) (iv) (i) (iii)
(B) (iv) (ii) (i) (iii)
(C) (iii) (i) (iv) (ii)
(D) (iv) (iii) (i) (ii) [NEET Odisha 2019]

27. Which type of tissue correctly matches with its location?

Tissue	Location
(A) Areolar tissue	(i) Tendons
(B) Transitional epithelium	(ii) Tip of nose
(C) Cuboidal epithelium	(iii) Lining of stomach
(D) Smooth muscle	(iv) Wall of intestine

[NEET Phase-I 2016]

28. Choose the correctly matched pair.

(A) Tendon-Specialised connective tissue
(B) Adipose tissue-Dense connective tissue
(C) Areolar tissue-Loose connective tissue
(D) Cartilage-Loose connective tissue [AIPMT 2014]

29. Choose the correctly matched pair.

(A) Inner lining of salivary ducts-Ciliated epithelium
(B) Moist surface of buccal cavity-Glandular epithelium
(C) Tubular parts of nephrons-Cuboidal epithelium
(D) Inner surface of bronchioles-Squamous epithelium [AIPMT 2014]

30. Identify the tissue shown in the diagram and match with its characteristics and its location.



(A) Smooth muscles, show branching, found in the wall of the heart.
(B) Cardiac muscles, unbranched muscles, found in the walls of the heart.
(C) Striated muscles, tapering at both-ends, attached with the bones of the ribs.
(D) Skeletal muscles, show striations and are closely attached with the bones of the limbs.

[NEET Karnataka 2013]

31. The type of muscles present in our:

(A) heart are involuntary and unstriated smooth muscles
(B) intestine are striated and involuntary
(C) thigh are striated and voluntary
(D) upper arm are smooth muscle fibres fusiform in shape.

[AIPMT Mains 2011]

32. The kind of epithelium which forms the inner walls of blood vessels is:

(A) cuboidal epithelium
(B) columnar epithelium
(C) ciliated columnar epithelium
(D) squamous epithelium.

[AIPMT Screening 2010]

33. The epithelial tissue present on the inner surface of bronchioles and fallopian tubes is:

(A) cuboidal (B) glandular
(C) ciliated (D) squamous.

[AIPMT Screening 2009]

34. Which one of the following is the correct pairing of a body part and the kind of muscle tissue that moves it?

(A) Heart wall	— Involuntary unstriated muscle
(B) Biceps of upper arm	— Smooth muscle fibres
(C) Abdominal wall	— Smooth muscle
(D) Iris	— Involuntary smooth muscle

[AIPMT Screening 2009]

35. In which one of the following preparations are you likely to come across cell junctions most frequently?

(A) Thrombocytes (B) Tendon
(C) Hyaline cartilage (D) Ciliated epithelium

[AIPMT 2007]

36. Mast cells of connective tissue contain:

(A) vasopressin and relaxin
(B) heparin and histamine
(C) heparin and calcitonin
(D) serotonin and melanin

[AIPMT 2004]

37. Which cells do not form layer and remain structurally separate?

(A) Epithelial cells (B) Muscle cells
(C) Nerve cells (D) Gland cells

[AIPMT 2001]

38. Simple epithelium is a tissue in which the cells are:

(A) hardened and provide support to the organs.
(B) cemented directly to one another to form a single layer.
(C) continuously dividing to form an organ.
(D) loosely connected to one another to form an irregular organ.

[AIPMT 2000]

39. Ligament is a/an:

(A) inelastic white fibrous tissue
(B) modified white fibrous tissue
(C) modified yellow elastic fibrous tissue
(D) none of the above.

[AIPMT 1999]

40. Stratum germinativum is an example of which kind of epithelium:

(A) Cuboidal (B) Ciliated
(C) Columnar (D) Squamous.

[AIPMT 1997]

41. Protein present in the matrix of cartilage is known as:

(A) chondrin (B) casein
(C) cartilagin (D) ossein

[AIPMT 1997]

42. The layer of actively dividing cells of skin is termed as:

(A) stratum compactum
(B) stratum corneum
(C) stratum malpighii/stratum germinativum
(D) stratum lucidum

[AIPMT 1993]

43. Hair present in the skin are:

(A) epidermal in origin and made of dead cells
(B) epidermal in origin and made of living cells
(C) dermal in origin and made of living cells
(D) dermal in origin and made of dead cells.

[AIPMT 1993]

44. Which of the following is not exclusively supplied with involuntary muscles?

(A) Muscular coats of blood vessels
(B) Muscles of the ducts of glands
(C) Muscles of iris
(D) Muscles of urethra.

[AIPMT 1998]

45. The alveolar epithelium in the lung is:
 (A) non-ciliated columnar
 (B) non-ciliated squamous
 (C) ciliated columnar
 (D) ciliated squamous.

[AIPMT 1990]

46. Histamine secreting cells are found in:
 (A) connective tissues (B) lungs
 (C) muscular tissue (d) nervous tissue.

[AIPMT 1989]

*7.4. Cockroach

47. Which of the following is/are present in female Cockroach?
 (I) Collateral gland (II) Mushroom gland
 (III) Spermatheca (IV) Anal Style
 (V) Phallic gland

Choose the most appropriate answer from the options given below:

(A) (II) and (IV) only (B) (II) and (V) only
 (C) (I) only (D) (I) and (III) only

[Re-NEET 2024]

48. In both sexes of cockroach, a pair of jointed filamentous structures called anal cerci are present on:
 (A) 10th segment (B) 8th and 9th segment
 (C) 11th segment (D) 5th segment [NEET 2024]

49. Match List I with List II related to digestive system of cockroach.

List I	List II
(a) The structures used for storing of food.	(i) Gizzard
(b) Ring of 6-8 blind tubules at junction of foregut and midgut.	(ii) Gastric Caeca
(c) Ring of 100-150 Yellow coloured thin filaments at junction of midgut and hindgut.	(iii) Malpighian tubules
(d) The structures used for grinding the food.	(iv) Crop

Choose the correct answer from the options given below:

(a) (b) (c) (d)
 (A) (i) (ii) (iii) (iv)
 (B) (iv) (iii) (ii) (i)
 (C) (iii) (ii) (iv) (i)
 (D) (iv) (ii) (iii) (i)

[NEET 2024]

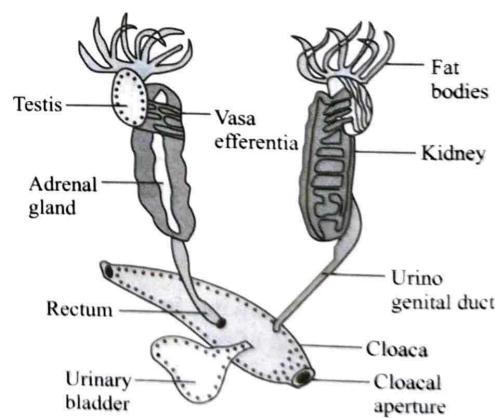
SOLUTIONS

1. (D) In male frog, germinal epithelium of seminiferous tubules produce sperms, which are transferred to kidney via vasa efferentia. Then they enter Bidder's canal from where the sperms are carried to the transverse collecting tubules, longitudinal collecting tubules and then to the urogenital duct. The latter carries the sperm to seminal vesicle where they are stored temporarily. From here sperm are carried to cloaca and then are shed into water.



Related Theory

→ The male reproductive system of a frog includes a pair of testes, Vasa efferentia (10-12 in number) and a urogenital duct that opens into the cloaca. The cloaca is a chamber, which is used to pass the faecal matter, urine as well as sperms to the outside. The female reproductive system has a pair of ovaries, a pair of oviducts that open into the cloaca separately.



Male Reproductive System of Frog



Mnemonics

→ This route can be learned as:

Test Vala Kidney lene Bihar or Udaipur Chale

Test	—	Testes
Vala	—	Vasa efferentia
Kidney lene	—	Kidney
Bihar or	—	Bidder's canal
Udaipur	—	Urinogenital duct
Chale	—	Cloaca

2. (D) Frog heart is myogenic and auto excitable in nature. This means the contraction of heart originates within muscles itself. When muscles contract, they release heat, which continues the electrochemical reactions in muscles, enabling the heart to contract even after its removal from the body.

Related Theory

→ Frogs are amphibians and have a closed circulatory system. It has a three-chambered heart, which includes two atria and a ventricle. The right atrium receives deoxygenated blood from the veins. Oxygenated and deoxygenated blood have a tendency to mix within the ventricle that is responsible for pumping blood. The left atrium receives oxygenated blood from both the lungs and the skin.

3. (B) Erythrocytes or RBCs of frog contain nucleus so these cell can undergo cell division. Erythrocytes in humans did not contain nuclei thus, giving all the space to haemoglobin to carry even more oxygen. RBCs in human have an average life span of 120 days after that they destroy themselves in spleen (graveyard of RBCs). And new RBCs arise from red bone marrow.

4. (C)

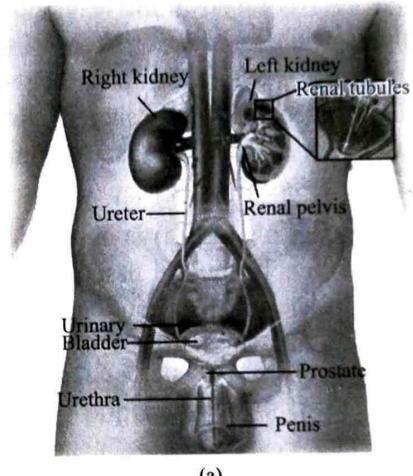
	Humans	Frogs
RBCs	Immature RBCs are nucleated; upon maturing, they become enucleated in order to increase the surface area to carry oxygen.	RBCs are nucleated throughout their lifespan.
Thyroid and parathyroid gland	Thyroid hormone required for metamorphosis.	Thyroid hormone required for metamorphosis and regulating metabolic processes.
Hepatic portal system	Present	Present
Paired cerebral hemisphere	Present	Present

Related Theory

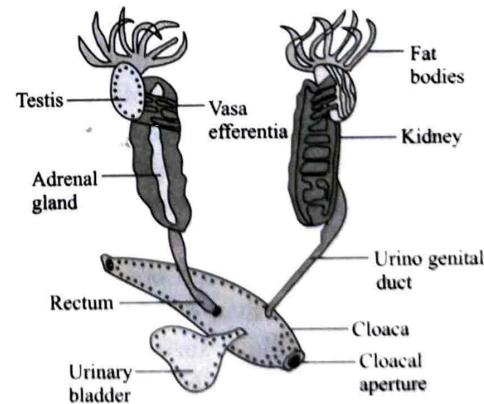
→ The human erythrocytes are discoid or bi-concave, enucleated, about 7–8 μm in diameter, with a central area of pallor and is well haemoglobinised in the outer two-third of the red blood cell diameters, without any inclusions. Human red blood cells are formed mainly in the bone marrow and are believed to have an average life span of approximately 120 days.

5. (A) The frogs shows cutaneous respiration in water, while pulmonary respiration on land. Hence, on dry land, they will die if their mouth is forcibly closed for some time. Frogs have a three-chambered heart. It consists of two atria and one ventricle. Tadpoles eliminate nitrogenous wastes as ammonia (ammonotelic), but adult frog mainly eliminates urea (ureotelic). They are not the uricotelic. Frogs habitat is in or near pond. The fertilisation is external and takes place inside pond water.

6. (D) In male frogs, two ureters emerge from the kidney. The ureters act as a duct of the urinogenital opening into the cloaca. The thin-walled urinary bladder, which opens in the cloaca, is ventral to the rectum. However, in humans, ureter is a tube that carries urine from the kidney to the urinary bladder. There are two ureters, one attached to each kidney. The upper half of the ureter is located in the abdomen and the lower half is located in the pelvic area.



(a)



Male Urinogenital Organs : (a) Human; (b) Frog

7. (D) Frog has smooth and moist skin. The mucous glands present in the skin of the frog secrete mucous that keeps the skin moist, make the animal slippery and more able to escape from the predators.

8. (A) Bull frog of India is called *Rana tigrina*.

9. (D) Skin in frogs is moist and permeable, which allows respiration. This type of respiration is called cutaneous respiration.

10. (B) Tight junctions prevent substances from leaking across tissues. Adhering junctions cement neighbouring cells together. Gap junctions enable cell communication by connecting the cytoplasm of adjoining cells, allowing for the rapid transfer of ions, small molecules, and occasionally larger molecules.

11. (B) Cells of cartilage called chondrocytes secrete collagen and elastin fibers. Cells of bone *i.e.*, osteoblasts that secrete collagen fibres, which are part of the bone matrix. Adipose tissue, primarily composed of adipocytes, collagen or elastin fibres. Blood does not secrete collagen or elastin fibres. Areolar tissue contains fibroblasts that secrete both collagen and elastin fibres.

12. (D) Squamous epithelium is a thin, flat layer of cells found in the lining of blood vessels. Ciliated epithelium is found in the respiratory tract and the fallopian tubes, where it helps in movement of particles or ova. Glandular epithelium contains cells that secrete mucus, such as goblet cells in the alimentary canal. Compound epithelium lines the ducts of glands such as the pancreas.

13. (A) In the given figures, (a) is a skeletal muscle tissue, (b) is a smooth muscle tissue and (c) is a cardiac muscle tissue. Skeletal muscle is located in biceps, in which striated (striped) skeletal muscle fibres are bundled together in a parallel fashion. Smooth muscle is found in the wall of internal organs, such as the blood vessels, stomach and intestine. Cardiac muscle tissue is a contractile tissue present only in the heart.

14. (B) Unicellular glandular epithelium, consists of isolated glandular cells (goblet cells of the alimentary canal), and multicellular glandular epithelium, consists of cluster of cells (salivary gland). Endocrine glands do not have ducts. Their products called hormones are secreted directly into the fluid bathing the gland. For example, pancreas. Compound epithelium that is made of more than one layer (multi-layered) of cells cover the moist surface of the buccal cavity. Their main function is to provide protection against chemical and mechanical stresses.

15. (A) Mast cells are a type of connective tissue cells found in areolar connective tissue. Bronchioles are part of the respiratory system and have ciliated epithelium on their inner surface. Blood is a specialised fluid connective tissue and does not have any epithelium. Tubular parts of nephron are part of the excretory system and have cuboidal epithelium.

16. (D) Ligaments are composed of dense regular connective tissue, not dense irregular tissue. Dense regular connective tissue is characterised by tightly packed collagen fibres arranged in parallel, which provides strength and support to structures, like tendons and ligaments. Cartilage, on the other hand, is not dense regular tissue. It is a type of supportive connective tissue that is avascular and not innervated. It is composed of chondrocytes (cartilage cells) and extracellular matrix, which consists mainly of collagen and proteoglycans.

17. (D) The majority of the respiratory tree, from the nasal cavity to the bronchi, is lined by columnar ciliated epithelium. Goblet cells are isolated glandular epithelium cells that secrete mucus. They are present in the stomach and intestine. Tendons are dense regular connective tissues that join muscles to bones and play a vital role in overall joint stability and function. Adipose tissues are loose connective tissues that are made up of fat cells called adipose cells or adipocytes.



Mnemonics

→ Following mnemonics can be used to memorise epithelial tissue cell junction types

Remember: *Shivaji College and Green City College Arranged a Get Together in December*

Epithelial tissues:

S-Squamous epithelium

C-Cuboidal epithelium

G-Glandular epithelium

C-Ciliated epithelium

C-Columnar epithelium

Cell junction types:

A-Adhering junction

G-Gap junction

T-Tight Junction

D-Desmosome

18. (A) There is white fibrous cartilage between the vertebrae to provide some mobility. This guarantees appropriate structural stiffness and bodily balances, while permitting just the minimal mobility needed.

19. (C) Connective tissues support and connect different tissues and organs of the body. Examples of specialised connective tissues are adipose tissue, cartilage, bone, blood, and lymph. Neuroglia is a type of specialised cell of the nervous system.

20. (C) Intercalated discs represent the undulating double membranes, where two cells are tightly bound together by desmosomes and connected by gap junctions, allowing electrical impulse conduction from cell to cell.



Related Theory

→ Gap junctions allow the exchange of ions, secondary messengers, and small metabolites between adjacent cells and are formed by two unrelated protein families, the pannexins and connexins.

21. (B) Tight junction refers to a specialised connection of two adjacent animal cell membranes, such that, space usually lying between them is absent, while a gap junction refers to a linkage of two adjacent cells consisting of a system of channels extending across a gap from one cell to the other, allowing the rapid transfer of ions, small molecules and sometimes even big molecules.



Related Theory

→ Plasmodesmata are intercellular channels that span the plant cell wall and serve as cytoplasmic bridges to facilitate efficient exchange of signalling molecules between neighbouring cells.

22. (A) Chondrocytes are cartilage cells. The intercellular material of cartilage is solid, pliable and resists compression. They produce and maintain the cartilaginous matrix, which consists mainly of collagen and proteoglycans.

23. (A) Goblet cells are modified columnar or cuboidal epithelial cells. Some of the columnar or cuboidal cells get specialised for secretion and are called glandular epithelium. They are of 2 types: unicellular, consisting of isolated glandular cells (for e.g., goblet cells of the alimentary canal), and multicellular, consisting of cluster of cells (for e.g., salivary gland).

24. (B) In the proximal convoluted tubule (PCT) of the nephron, there is a cuboidal epithelium with a brush border of microvilli. The cuboidal epithelium lines the salivary gland ducts. Ciliated columnar epithelium makes up the lining of the eustachian tube. The compound epithelium lines the salivary gland ducts.

25. (C) In humans, ciliated epithelial cells are present in the bronchioles and fallopian tubes. In bronchioles, they help in the movement of mucus, while in fallopian tubes, they help in movement of egg or ovum towards the uterus. Salivary ducts and pancreatic ducts are lined by simple cuboidal epithelial cells. Bile duct is lined by simple columnar epithelial cells and eustachian tube is lined by columnar epithelial ciliated cells.



Related Theory

→ The trachea and bronchi are lined by stratified ciliated epithelium. Four major types of simple epithelium are: simple squamous epithelium, simple cuboidal epithelium, simple columnar epithelium and pseudostratified epithelium. The

basement membrane serves as a foundation for the epithelium, but it also has important barrier functions for the submucosa. It therefore plays an important role in the processes of defence, growth and repair of the mucosa.

Caution

→ Students usually choose incorrect option in such questions. Just remember the function of cilia, which help in movement of substance in one direction and choose the option accordingly, which justify the function of cilia.

26. (C) Tight junctions are tightly stitched between the cells. The junction completely encircles each cell, preventing the movement and leakage of material between the cells. Adhering junctions perform cementing to keep neighbouring cells together. Gap junctions allow communication between cells through the exchange of materials or the transmission of electrical impulses by connecting their cytoplasm. Synaptic junction is the site of transmission of electric nerve impulses between two nerve cells (neurons) or between a neuron and a gland or muscle cell (effector) with the help of a chemical.



Related Theory

→ Desmosomes are another type of cell junction, composed of protein attachments between adjacent cells. Inside the plasma membrane, a desmosome bears a disc-shaped structure from which protein fibres extend into the cytoplasm. Desmosomes act like spot welds to hold together tissues that undergo considerable stress (such as skin or heart muscle).

27. (D) Areolar connective tissue holds organs in place and attaches epithelial tissue to other underlying tissues. Transitional epithelium is a type of stratified epithelium consisting of multiple layers of epithelial cells, which can contract and expand in order to adapt to the degree of distension needed. It is found in urinary bladder. Simple cuboidal epithelium is a type of epithelium that consists of a single layer of cuboidal (cube-like) cells. It is found in ducts and secretory portions of small glands and in kidney tubules. Tendon is a dense connective tissue which joins bone and muscles. Elastic cartilage is found in tip of the nose. Columnar epithelium is present in the lining of the stomach.

28. (C) Areolar and adipose tissue are loose connective tissue, which provide flexibility and cushioning. Tendon is a dense connective tissue, which connects muscles with bone. Cartilage is a specialised connective tissue, which connects muscles together.



Related Theory

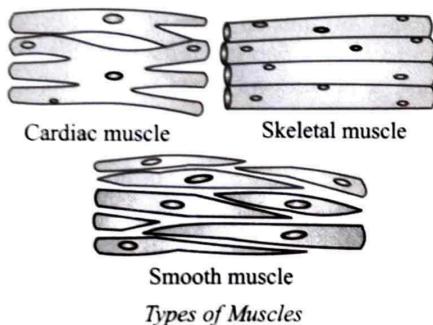
→ Connective tissues develop from the mesodermal cells of the embryo. Connective tissues include cartilage, bone, adipose and blood. In all connective tissues except blood, the cells secrete fibres of structural proteins called collagen or elastin. They support and bind other tissues in the body. These are made up of three components: Intercellular matrix, cells and fibres.

29. (C) Cuboidal epithelium is present in the tubular parts of nephron (PCT and DCT). They often forms microvilli to increase the absorptive surface area of the cell. Inner lining of salivary ducts are lined by compound epithelium. Moist surface of buccal cavity is lined by compound epithelium. Inner surface of bronchioles is lined by ciliated epithelium.

Caution

→ In NEET, most of the examples asked are from NCERT only. Students should memorise all the NCERT examples for each relevant topics.

30. (D) Skeletal muscles show alternate light and dark bands or striations and hence, called striated muscles. The cells are long, cylindrical, unbranched and multinucleate (having many nuclei). Smooth or involuntary muscles are unstriated muscles. The cells are long with pointed ends (spindle-shaped) and uninucleate (having a single nucleus). Cardiac muscles or heart muscle cells are cylindrical, branched and uninucleate. They are involuntary in nature.



Related Theory

→ Muscular tissue consists of elongated cells, also called muscle fibres. This tissue is responsible for movement in our body. Muscles contain special proteins called contractile proteins, which contract and relax to cause movement.

Mnemonics

→ Types of muscles in human body can be memorised as:

SSC EXAM

S – Skeletal muscle

S – Smooth muscle

C – Cardiac muscle

31. (C) Thigh muscles and upper arm muscles are skeletal muscles, which show alternate light and dark bands or striations and hence, called striated muscles. The cells of this tissue are long, cylindrical, unbranched and multinucleate (having many nuclei). Thigh muscles are voluntary in nature as they can move at the will of human.

32. (D) Blood vessels are lined with simple squamous epithelium, where diffusion and filtration takes place. Cuboidal epithelium is found in ducts of glands and tubular parts of nephrons in kidney

and its main function is secretion and absorption. Ciliated epithelium is mainly present in the inner surface of hollow organs, like bronchioles and fallopian tubes. They move particles or mucus in a specific direction over the epithelium. Glandular epithelium is columnar epithelium specialised for secretion. It is found in the goblet cells of the alimentary canal and in salivary glands.

33. (C) Ciliated columnar epithelium lines the respiratory tract (lower end of bronchi), fallopian tubes, ventricles of brain (ependyma), central canal of spinal cord, etc.

34. (D) Smooth muscles occur in the walls of hollow internal organs, in capsules of lymph glands, spleen etc., in iris and ciliary body of eyes, skin dermis, penis and other accessory genitalia etc. Heart wall have cardiac muscles. Skeletal muscles are voluntary muscles, like biceps of upper arm, abdominal wall, etc.

Caution

→ Students should remember that smooth muscles are involuntary only and never act voluntarily.

35. (D) Cell junctions are especially abundant in epithelial tissues. They consist of protein complexes and provide contact between neighbouring cells, between a cell and the extracellular matrix, or they built up the paracellular barrier of epithelia and control the paracellular transport. The other three (thrombocytes, tendon and hyaline cartilage) belongs to connective tissue. Thrombocytes or platelets aid the formation of blood clots by releasing various protein substances. Tendon attaches a muscle to a bone and hyaline cartilage gives flexibility and support at the joints.

Related Theory

→ Ciliated epithelium is a region of epithelium consisting of columnar or cuboidal cells bearing hair-like appendages that are capable of beating rapidly. Ciliated epithelium performs the function of moving particles or fluid over the epithelial surface in structures, such as the trachea, bronchial tubes and nasal cavities. It often occurs in the vicinity of mucus-secreting goblet cells.

36. (B) Mast cells secrete heparin (anti-coagulant), histamine (vasodilator) and serotonin (vasoconstrictor) along with other enzymes and hormones, such as cytokines, peptidoglycans, protease etc. Relaxin is secreted by placenta. Calcitonin is secreted by thyroid gland. Melanin is secreted by dermal cells.

Related Theory

→ Mast cells contribute to homeostasis in the immune system. They serve as a first line of defense against antigens entering the body due to their location in the skin and mucosa.

37. (C) Nerve cells make complex nervous system, which provides point to point interaction in our body, and being the command center of our body, control functions, like breathing, circulation, thoughts etc. They don't form layer and remain structurally separate from each other.

38. (B) The basal lamina is covered by a single layer of cells that make up the simple epithelium. These cells are cemented together. This epithelium helps in diffusion, absorption, filtration, and secretion by lining the body's cavities, tubes, and ducts.

39. (C) The ligament is a type of modified yellow elastic fibrous tissue, which connects bone to bone. They mainly consist of collagen fibres arranged in bundles with fibroblasts.

Related Theory

- Ligament is a type of yellow elastic fibrous connective tissue, which connects bones. Matrix of this connective tissue contains a large amount of branched, yellow elastic fibres, which are densely packed together with a few fibroblasts. This tissue occurs in the parts where elasticity is mainly required. These fibres are yellow in colour and are composed of elastin protein.
- Tendons are cord or band-like structures, which join muscle to bones. In the tendon, a parallel bundle of collagen fibres with rows of fibroblast in between, are present.

40. (C) Stratum germinativum is an example of columnar type of epithelium. The innermost layer called stratum germinativum has columnar cells resting upon a common basement membrane. It is the deepest layer of the five layers of the epidermis and also the outer covering of skin in mammals.

41. (A) Cartilage is a flexible and tough connective tissue. Chondrin protein is present in cartilage. Cartilage is formed of specialised cells known as chondrocytes.

42. (C) The innermost layer, stratum malpighii, actively divides to create new cells through mitosis to replace the cells that are harmed or destroyed as a result of normal wear and tear.

43. (A) The epidermis gives rise to keratinized strands of cells that make up hair. It is regarded as a skin appendage since it grows from the skin. Except for the lips, the tip of the penis, the inner lips of the vulva, and the nipples, it covers the whole body. The shaft of hair (visible part) is dead, whereas, the root (invisible) is living part of the hair.

44. (D) Urethra contain voluntary muscles, which gets conscious signal when bladder fills up for micturition.

45. (B) Alveoli are groups of sac-like terminals of each bronchiole lined by simple squamous and non-ciliated epithelium. They help to move oxygen and carbon dioxide (CO_2) molecules into and out of bloodstream.

Related Theory

- The alveolar membrane is the gaseous exchange surface, surrounded by a network of capillaries. It is surrounded by flattened, non-ciliated squamous cells to increase the surface area. Across the membrane oxygen is diffused into the capillaries and carbon dioxide is released from the capillaries into the alveoli to be released out through nostrils.

46. (A) Histamine is secreted by mast cells found in areolar connective tissue. Histamines cause all the allergic reactions in human body such as, running nose or sneezing, the regulation of vasodilation and etc. It all starts when our immune system finds something unrecognisable, then blood releases histamine.

47. (D) In female cockroaches, the 7th sternum is boat-shaped and together with the 8th and 9th sterna forms a brood or genital pouch, whose anterior part contains collateral glands (I) and spermatheca (III). Collateral glands produce substances that form the egg case (ootheca), while spermatheca stores sperm received during mating. Mushroom glands (II), anal styles (IV), and phallic glands (V) are found in male cockroaches. Anal styles are absent in females.

48. (A) In both sexes of male and female cockroaches, the 10th segment bears a pair of jointed filamentous structures called anal cerci.

49. (D) In cockroaches, a crop is a sac-like structure used for storing food. A ring of 6–8 blind tubules called hepatic or gastric caeca is present at the junction of the foregut and midgut, which secrete digestive juice. A ring of 100–150 yellow-coloured, thin filamentous Malpighian tubules is present at the junction of the midgut and hindgut. The crop is followed by gizzard or proventriculus. Gizzard helps in grinding the food particles.

