KATTAR NEET 2026

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Structural Organization in Animals

Q1 A student is examining a tissue sample under a microscope and notes the following cellular characteristics: cells are fusiform in shape, lack striations, are connected by cell junctions, are bundled within a connective tissue sheath. The student also observes that these cells are involuntary. Which of the following conclusions is MOST accurate about this tissue sample?"

(A) The tissue is epithelial tissue specialized for absorption and secretion in internal organs, indirectly influenced by the autonomic nervous system.

(B) The tissue is muscular tissue, specifically found in the walls of vertebrate blood vessels.

(C) The tissue is connective tissue with inherent rhythmic contractility, facilitating movement within skeletal muscle structures.

(D) The tissue is a unique muscle type, characterized by its close attachment to skeletal bones.

Q2 Considering the structural organization of the stomach, lung, heart, and kidney, identify the **INCORRECT** statement from the following:"

(A) All of these organs are composed of epithelial, connective, muscular, and nervous tissue.

(B) Each of these structures is correctly classified as an organ.

(C) While the stomach and heart exhibit all four tissue types, the lung and kidney are primarily composed of only two tissue types.

(D) Each of these organs demonstrates a division of labor among its constituent tissues.

Q3 In which of the following scenarios would a cell utilize tight junctions most effectively?

(A) Facilitating rapid transport of ions between cells in a cardiac muscle tissue.

(B) Allowing for communication between cells in a nerve synapse.

(C) Maintaining the integrity of the blood-brain barrier.

(D) Enhancing the flexibility of connective tissue.

Q4 Match the following with reference to cockroach and choose the **correct** option.

	Column I		**Column II**
A.	Phallomere	i.	Chain of developing ova
B.	Gonopore	ii.	Bundles of sperm
C.	Spermatophore	iii.	Opening of the ejaculatory duct
D	Ovarioles	iv.	The external genitalia

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

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

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

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

Q5 Which of the following statements is **correct**?

(A) Cartilage is a dense regular tissue.

(B) Cuboidal epithelium is found in ducts of glands.

(C) Intercalated disc is present in smooth muscle.

(D) Only columnar epithelium helps in secretion and absorption.

Q6 Which cell type is predominantly responsible for the efficient gaseous exchange in the air sacs of mammalian lungs?

(A) Microvilli-rich cells

(B) Ciliated cells

(C) Flattened cells

(D) Columnar cells

Q7 What is the primary function of gap junctions?
(A) Intercellular impermeability
(B) Cellular adhesion
(C) Cytoplasmic connection for rapid solute transfer
(D) Intercellular isolation for solvent transfer

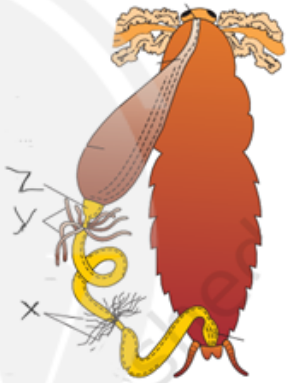
Q8 Read the following statements **(I-V)**
I. Bone's rigid, mineralized matrix with osteocytes in lacunae provides skeletal support
II. In cockroaches, metathoracic and mesothoracic legs are present
III. Neurons make up more than one half the volume of neural tissue.
IV. Muscles play an active role in all the movements of the body.
V. Mast cells are found in one of loose connective tissue.
How many of the above statements are **correct**?
(A) One only (B) Three only
(C) Four only (D) Five only

Q9 Frogs exhibit different respiratory mechanisms in aquatic and terrestrial environments, as well as during periods of dormancy. Consider the following statement: "Frogs respire in water primarily through lungs, and on land primarily through the buccal cavity; during hibernation, gaseous exchange occurs mainly via the skin."
Choose the **correct** answer from the following:
(A) The statement is true for aquatic respiration but false for terrestrial respiration and hibernation.
(B) The statement is true for terrestrial respiration but false for aquatic respiration and hibernation.
(C) The statement is true for hibernation but false for aquatic and terrestrial respiration.
(D) The statement is false for aquatic respiration, terrestrial respiration, and hibernation.

Q10 The mouth part of the cockroach shown in the given diagram acts as a/an:

(A) upper lip. (B) tongue.
(C) lower lip. (D) uvula.

Q11 The diagram represents a portion of an insect's digestive system. Select the option that **correctly** matches the labeled structures **X, Y,** and **Z** with their respective functions and names:
Functions:
1. Removal of nitrogenous waste products.
2. Secretion of digestive juices.
3. Mechanical breakdown (grinding) of ingested food.



(A) 1-Z-Hepatic caeca, 2-X-Mesenteron, 3-Y-Gastric caeca
(B) 1-Y-Hepatic caeca, 2-X-Malpighian tubules, 3-Z- Proventriculus
(C) 1-Z-Hepatic caeca, 2-X-Mesenteron, 3-Y-Gizzard
(D) 1-X-Malpighian tubules, 2-Y-Hepatic caeca, 3-Z- Proventriculus

Q12 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:
Assertion A: Adipose tissue is specialized for triglyceride storage.
Reason R: Excess, unused nutrients are converted into fats and stored within adipocytes.
In the light of the above statements, choose the **correct** answer from the options given below:

(A) A is true but R is false.
(B) A is false but R is true.
(C) Both A and R are true and R is the correct explanation of A.
(D) Both A and R are true but R is NOT the correct explanation of A.

Q13 Match **List-I** with **List-II** w.r.t. frog.

	List-I		**List-II**
(A)	Touch	(I)	Nasal epithelium
(B)	Smell	(II)	Foramen magnum
(C)	Cranial nerves	(III)	Sensory papillae
(D)	Medulla oblongata	(IV)	Peripheral nervous system

Choose the **correct** answer from the options given below:
(A) A-III, B-I, C-II, D-IV
(B) A-II, B-I, C-IV, D-III
(C) A-III, B-IV, C-II, D-I
(D) A-III, B-I, C-IV, D-II

Q14 Which of the following statements accurately contrasts the visual capabilities of a cockroach with that of a human?
(A) Cockroaches possess a higher resolution vision due to the greater number of ommatidia compared to the human eye
(B) Humans have mosaic vision, allowing them to detect rapid movements more effectively than cockroaches.
(C) Cockroaches have higher sensitivity but lower resolution vision, enabling them to see better in low light compared to humans.
(D) The dorsal placement of eyes in cockroaches provides them with a wider field of binocular vision than humans.

Q15 Read the following statements **(A-E)**.
A. Salivary gland is a exocrine gland.
B. Forewings of cockroaches arises from prothorax.
C. Frog is a ureotelic animal.
D. Functional units of kidneys are uriniferous tubules.
E. Frog has three chambered heart.
Which of the following statements are **correct**?
(A) A, B and D only
(B) D and E only
(C) B and C only
(D) A, C, D and E only

Q16 Given below are two statements:
Statement I: In frogs, the forelimbs and hindlimbs help in swimming and burrowing.
Statement II: Body of a frog is divisible into head and trunk.
In the light of the above statements, choose the *most appropriate* answer from the options given below:
(A) Statement I is correct but Statement II is incorrect.
(B) Statement I is incorrect but Statement II is correct.
(C) Both Statement I and Statement II are correct.
(D) Both Statement I and Statement II are incorrect.

Q17 Choose the **correct** statement w.r.t frog.
(A) Development is direct through tadpole larvae.
(B) Forebrain of frog includes paired diencephalon.
(C) The lungs of frogs are a pair of elongated, pink coloured sac-like structures.
(D) Sexual dimorphism is absent in frogs.

Q18 Which of the following statements is **incorrect**?
(A) Female cockroach possesses sixteen ovarioles in both ovaries
(B) Cockroach segments feature dorsal sternites and ventral tergites.
(C) A mushroom-shaped gland is present in the 6th-7th abdominal segments of male cockroach
(D) A pair of spermatheca is present in the 6th segment of female cockroach.

Q19 Select the **incorrect** statements about the hind wings of cockroach.
A. Flight is not their function.

B. They are also known as mesothoracic wings.
C. They are transparent and membranous.
(A) A only
(B) A and B only
(C) A and C only
(D) A, B and C

Q20 In frogs, one pair of limbs is larger and more muscular than the other pair. How many digits are present in each of these limb types, respectively (smaller, less muscular : larger, more muscular)?
(A) Three and Four (B) Five and Four
(C) Four and Five (D) Four and Three

Q21 Which of the following is **mismatched** w.r.t. *Rana tigrina*?
(A) Hepatic portal system : Special venous connection between liver and intestine
(B) Renal portal system : Special venous connection between kidneys and lower parts of the body
(C) RBCs : Nucleated and contain haemoglobin
(D) Lymph : Has proteins and RBCs

Q22 Read the following statements **(I-V)** w.r.t frog.
I. In male frogs vocal sacs and copulatory pads are present on forelimbs.
II. The alimentary canal is short because frogs are omnivores.
III. Fertilisation is internal and takes place in water.
IV. A mature female can lay 2500 to 3000 ova at a time.
V. Frogs maintain ecological balance as key components of food chains.
Choose the most appropriate answer from the options given below:
(A) Only I and II are incorrect.
(B) Only II and III are incorrect.
(C) Only III and IV are incorrect.
(D) Only II and V are incorrect

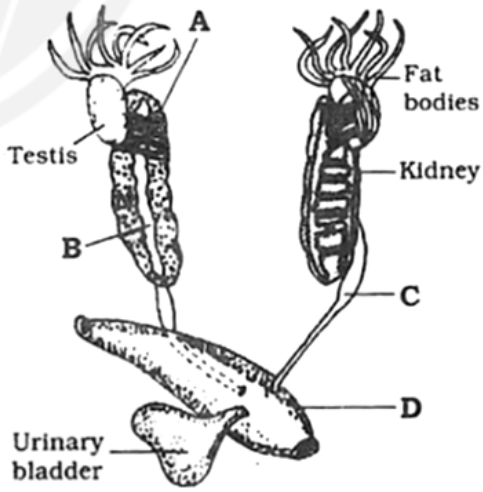
Q23 Select the **incorrect** statement from the ones given below with respect to *Periplaneta americana*.
(A) Tracheal network opens via 10 lateral spiracle.
(B) Males bear a pair of short thread like anal styles.
(C) The ootheca is formed by secretions from the female's colleterial glands.
(D) Brood pouch is formed by the fusion of 7^{th}, 8^{th} , and 9^{th} sternum.

Q24 Match **list-I** and **list-II** w.r.t. cockroach:

	List I (structure)		**List II (abdominal segment)**
(A)	Testes	(I)	2nd to 6th
(B)	Ovaries	(II)	4th to 6th
(C)	Spermatheca	(III)	6th
(D)	Mushroom gland	(IV)	6th - 7th

Choose the **correct** answer from the options given below:
(A) A -I, B-II, C-III, D-IV
(B) A -II, B-I, C-III, D-IV
(C) A -II, B-IV, C-I, D-III
(D) A -III, B-I, C-IV, D-II

Q25 Go through the following figure indicating the male reproductive system of frog. Identify A to D.



	A	B	C	D
(A)	Bidder's canal	Adrenal gland	Urinogenital duct	Rectum
(B)	Bidder's canal	Adrenal gland	Urinogenital duct	Cloaca

(C)	Vasa efferentia	Adrenal gland	Urinogenital duct	Cloaca
(D)	Vasa efferentia	Thyroid gland	Urinogenital duct	Cloaca

Q26 Match **List-I** with **List-II** w.r.t. frogs.

	List-I		**List-II**
(A)	Testes	(I)	Urinogenital duct
(B)	Ureters	(II)	Ovoid
(C)	Sinus venosus	(III)	On the ventral side of a frog's heart
(D)	Conus arteriosus	(IV)	Triangular structure

Choose the **correct** answer from the options given below:
(A) A-I, B-II, C-III, D-IV
(B) A-II, B-I, C-IV, D-III
(C) A-III, B-IV, C-I, D-II
(D) A-I, B-II, C-IV, D-III

Q27 Which type of animal tissue changes the diameter of a blood vessel?
(A) Epithelium (B) Connective
(C) Muscle (D) Neural

Q28 A girl found a small creepy organism in garden. When she touched that organism, it recoils. Which tissue in the body of organism primarily enables it to respond to the touch?
(A) Muscle tissue
(B) Connective tissue
(C) Neural tissue
(D) Epithelial tissue

Q29 Consider the following statements w.r.t vascular system of frog.
A. The vascular system of frog is open type.
B. Blood vascular system includes heart, blood and blood vessels.
C. Frogs do not have a lymphatic system.
D. Heart of frog is situated in the upper part of the body cavity.
E. Sinus venosus joins the left atrium.
Which of the above statement is/are **correct**?
(A) C and E only (B) B and D only
(C) A and D only (D) A and B only

Q30 Choose the **incorrect** statement.
(A) All voluntary muscle fibres are striated but all striated muscle fibres are not voluntary.
(B) All smooth muscle fibres are involuntary but all involuntary muscle fibres are not smooth.
(C) All connective tissues have fibres but all fibre forming tissues are not connective tissue.
(D) Excitable cells are present in neural tissue but all cells of neural tissue are not excitable.

Q31 In following given options, series of same type of tissues are given with a single odd one.
Choose the option which represents the same series of tissues without odd one.
(A) Areolar tissue, blood, neuron, tendon
(B) Myocardium blood, bone, cartilage
(C) Endothelium, tendon, ligament, dermis of skin
(D) Squamous, cuboidal, columnar and ciliated epithelium

Q32 Connective tissue is most abundant and widely distributed tissue in the body of complex animals because;
(I) Dense connective tissue is present in our skin.
(II) Major circulating fluid of the body is blood which is a specialized connective tissue.
(III) They are responsible for linking and supporting of other tissues and organs.
(IV) Specialized connective tissues form structural framework of the body.
Choose the option with **correct** statements only.
(A) (I) and (II) only
(B) (I), (II) and (III) only
(C) (I) and (III) only
(D) (I), (II), (III) and (IV)

Q33 Two cockroaches (A) and (B) are being studied. Out of them, one is male and one is female. Cockroach (A) has one pair of short thread-like structures and one pair of long and thick jointed filamentous structure at the hind end. The other

cockroach (B) has only one pair of filamentous structures arising from 10th tergum. Which cockroach among the given is male and female respectively.

(A) A and B

(B) Information is not sufficient

(C) B and A

(D) Cockroaches do not show sexual dimorphism

Q34 A terrestrial animal species is discovered with the Following larval characteristics: chitinous exoskeleton, system of tubes for gas exchange and segmentation. A knowledgeable zoologist should predict that its adults would also feature;

(A) Eight legs

(B) Two pairs of antennae

(C) A sessile lifestyle

(D) An open circulatory system

Q35 Match **List-I** with **List-II** and choose the **correct** option.

List-I		List-II	
(A)	Compound epithelium	(I)	Mosaic vision
(B)	Compound eye	(II)	Bone
(C)	Genitalia	(III)	Skin
(D)	Osteocytes	(IV)	Phallomere

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

Q36 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion (A): In frogs, the excretory framework encompasses a dual set of kidneys, ureters, a cloaca, and a urinary bladder.

Reason (R): These structures are condensed, deep red, and resemble beans. They are positioned slightly towards the back within the body cavity on both sides of the vertebral column.

In the light of the above statements, choose the **correct** answer from the options given below:

(A) A is true but R is false.

(B) A is false but R is true.

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

(D) Both A and R are true but R is NOT the correct explanation of A.

Q37 Find the **correct** statements:

A. Circulatory system in frogs is closed with single circulation.

B. Connective tissue covers all three types of tissues.

C. The larval stage of cockroach is called caterpillar.

D. Fibroblasts, macrophages and mast cells are present in cartilage.

E. Cartilage and bone are both structural materials.

Choose the **correct** answer from the options given below:

(A) A and E Only

(B) B and E Only

(C) B, C, D and E Only

(D) A, C, D and E Only

Q38 Given below are two statement: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion (A): Like mammals, the lymph in frog is different from blood as it lacks many proteins and enucleated RBCs.

Reason (R): Frogs and mammals share many similarities in their organ systems due to their shared vertebrate ancestry.

In the light of the above statements, choose the correct answer from the options given below:

(A) A is true but R is false.

(B) A is false but R is true.

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

(D) Both A and R are true but R is NOT the correct explanation of A.

Q39 Given below are two statement: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: Frogs possess a relatively short alimentary canal.

Reason R: The dietary habits of an organism significantly influence the length of its alimentary canal.

In the light of the above statements, choose the correct answer from the options given below:

(A) A is true but R is false.

(B) A is false but R is true.

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

(D) Both A and R are true but R is NOT the correct explanation of A.

Q40 Identify the **incorrect** option with respect to the diagram given below.

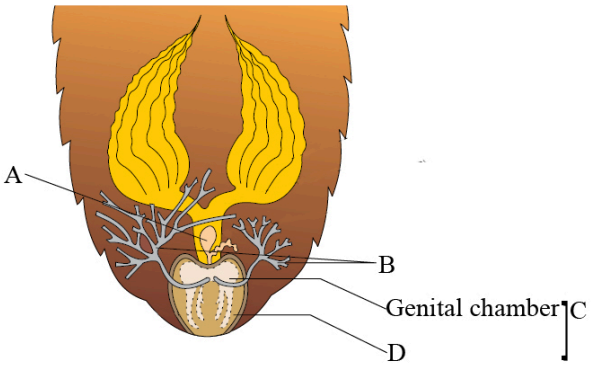
(A) It represents a multicellular glandular epithelium

(B) It can be endocrine or exocrine.

(C) It is a modification of simple squamous epithelium.

(D) These types of glandular epithelium is present in salivary glands.

Q41



Which of the option represents wrong identification for the given alphabet.

(A) A- spermatheca

(B) B- collaterial glands

(C) C - Genital pouch

(D) D- Vagina

Q42 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.	Proventriculus
(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) A-III, B-II, C-IV, D-I

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

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

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

Q43 Each organ in our body is made of one or more type of tissues. We also notice, after some careful study that the complexity in organ and organ systems displays certain discernable trend.

Given below are two statements about the above information:

Statement I: This discernable trend is called morphological trend.

Statement II: Our heart consists of all the four types of tissues, i.e., epithelial, connective, muscular and neural.

In the light of the above statements, choose the **most appropriate** answer from the options given below:

(A) Both Statement I and Statement II are correct.

(B)

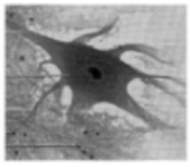
Both Statement I and Statement II are incorrect.

(C) Statement I is correct but Statement II is incorrect.

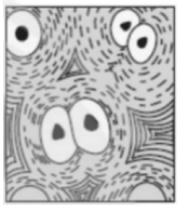
(D) Statement I is incorrect but Statement II is correct.

Q44 See the figures given below and select the mismatch w.r.t. identification or corresponding feature listed.

(A) 
Voluntary, striated fibres exhibiting structural syncytium

(B) 
Cell body is rich in Nissl's granules

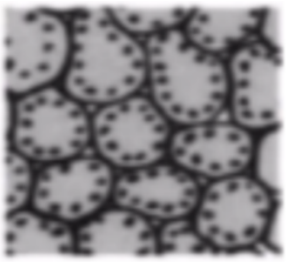
(C) 
Fibres with gap junctions between adjacent cells

(D) 
Intercellular material arranged in concentric lamellae and cells are found in lacunae.

Q45 A school student observed a slide of blood cells under microscope. His teacher asked him to draw the diagram. Select the diagram which should be drawn by the student.

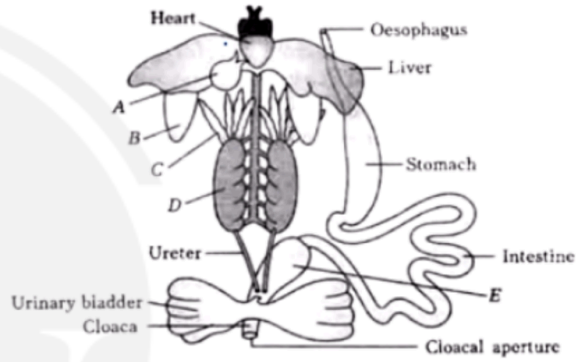
(A) 

(B) 

(C) 

(D) Both (A) and (B)

Q46 The given figure is related to diagrammatic representation of internal of frog. Identify A to E.



	A	B	C	D	E
(A)	Gall bladder	Lung	Fat bodies	Kidney	Rectum
(B)	Gall bladder	Lung	Testes	Kidney	Rectum
(C)	Gall bladder	Lung	Ovary	Testes	Rectum
(D)	Gall bladder	Lung	Fact bodies	Testes	Rectum

Q47 Given below are two statement: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: The cockroach's exoskeleton is a jointed structure that facilitates body movement.

Reason R: The exoskeleton comprises hardened plates called sclerites, which are interconnected

by thin and flexible articular membranes.

In the light of the above statements, choose the **correct** answer from the options given below:

(A) A is true but R is false.

(B) A is false but R is true.

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

(D) Both A and R are true but R is NOT the correct explanation of A.

Q48 Identify the following statements as **true(T)** or **false(F).**

A. Male cockroaches have a single testis located on lateral sides of 4^{th}-6^{th} abdominal segments.

B. In cockroaches, sperms are stored together in seminal vesicles and are glued together in the form of bundles called spermatheca.

C. Mosaic vision has more sensitivity and less resolution.

D. Brain in cockroach is located in the head region and represented by sub-oesophageal ganglion.

	A	B	C	D
(A)	F	T	T	F
(B)	F	F	T	F
(C)	F	T	F	T
(D)	T	F	F	T

Q49 Given below are two statements:

Statement I: Frogs do not drink water because they can fulfil their need of water from food.

Statement II: The wing pads are found in the last nymphal stage of cockroach.

In the light of the above statements, choose the most appropriate answer from the options given below:

(A) Statement I is correct but Statement II is incorrect.

(B) Statement I is incorrect but Statement II is correct.

(C) Both Statement I and Statement II are correct.

(D) Both Statement I and Statement II are incorrect.

Q50 In female cockroaches (*Periplaneta americana*), the collateral glands are accessory reproductive glands that play a crucial role in reproduction. Which of the following statements accurately describes the collateral glands?

A. They are paired, highly branched tubular glands located dorsally to the genital pouch.

B. Their secretions form the rigid, protective oothecal case around fertilized eggs.

C. The left collateral gland is larger and secretes a protein-rich secretion, while the right gland secretes a glucoside that aids in hardening the secretion.

D. Both glands open into the genital chamber.

(A) A and B only

(B) A, B and C only

(C) A, B, C and D

(D) B and D only

Answer Key

Q1	(B)	Q26	(B)
Q2	(C)	Q27	(C)
Q3	(C)	Q28	(C)
Q4	(B)	Q29	(B)
Q5	(B)	Q30	(C)
Q6	(C)	Q31	(D)
Q7	(C)	Q32	(D)
Q8	(C)	Q33	(A)
Q9	(C)	Q34	(D)
Q10	(C)	Q35	(C)
Q11	(D)	Q36	(D)
Q12	(C)	Q37	(B)
Q13	(D)	Q38	(B)
Q14	(C)	Q39	(C)
Q15	(D)	Q40	(C)
Q16	(C)	Q41	(D)
Q17	(C)	Q42	(B)
Q18	(B)	Q43	(D)
Q19	(B)	Q44	(D)
Q20	(C)	Q45	(D)
Q21	(D)	Q46	(A)
Q22	(B)	Q47	(C)
Q23	(A)	Q48	(B)
Q24	(B)	Q49	(D)
Q25	(C)	Q50	(C)

Hints & Solutions

Q1 Text Solution:

(B)

Fusiform shape: This is characteristic of smooth muscle cells.

Lack of striations: Smooth muscle tissue appears smooth under a microscope, lacking the banding pattern (striations) seen in skeletal and cardiac muscle.

Connected by cell junctions: Smooth muscle cells are connected by gap junctions, allowing for coordinated contraction.

Bundled within a connective tissue sheath: Smooth muscle is organized into layers or bundles surrounded by connective tissue.

Smooth muscles are 'involuntary' as their functioning cannot be directly controlled. We usually are not able to make it contract merely by thinking about it as we can do with skeletal muscles.

[NCERT(2020-21) Class 11th Page No. 105]

Q2 Text Solution:

(C)

Lungs: Contain epithelial tissue (lining the alveoli and airways), connective tissue (providing support and elasticity), smooth muscle (in the airways and blood vessels), and nervous tissue (for regulation).

Kidneys: Contain epithelial tissue (forming tubules), connective tissue (providing support), smooth muscle (in blood vessels and ureters), and nervous tissue (for regulation). Both the lungs and kidneys exhibit all four tissue types, not just primarily two.

[NCERT (2020-21) Class 11th Page No. 100]

Q3 Text Solution:

(C)

Maintaining the integrity of the blood-brain barrier. Tight junctions create a barrier that prevents leakage between cells. They are particularly important in tissues like the blood-brain barrier where maintaining separation is crucial.

[NCERT(2020-21) Class 11th Page No. 102]

Q4 Text Solution:

(B)

A. Phallomere - iv. The external genitalia (Phallomeres are chitinous asymmetrical structures surrounding the male gonopore and aid in copulation, forming part of the external genitalia.)

B. Gonopore - iii. Opening of the ejaculatory duct (The gonopore is the external opening through which sperm is released from the male cockroach.)

C. Spermatophore - ii. Bundles of sperm (The spermatophore is a capsule or packet containing sperm that is transferred to the female during mating.)

D. Ovarioles - i. Chain of developing ova (Ovarioles are the tubes within the cockroach ovary where eggs develop in a chain.)

[NCERT(2020-21) Class 11th Page No. 114]

Q5 Text Solution:

(B)

Cartilage is a specialized type of connective tissue.

Intercalated disc is present in cardiac muscle.

columnar epithelium is well-known for its roles in secretion (e.g., in the digestive tract) and absorption (e.g., lining the intestines), it is not the *only* type of epithelium involved in these processes. Cuboidal epithelium, for instance, also plays a role in secretion and absorption in the ducts of glands and kidney tubules.

[NCERT(2020-21) Class 11th Page No.101, 102, 103]

Q6 Text Solution:

(C)

The cell type predominantly responsible for the efficient gaseous exchange in the air sacs

(alveoli) of mammalian lungs is flattened cells.

[NCERT(2020-21) Class 11th Page No.101]

Q7 Text Solution:

(C)

- **Gap junctions** are specialized intercellular connections that directly connect the cytoplasm of two cells.
- They are formed by protein channels (connexons) that span the gap between adjacent cell membranes.
- These junctions allow the passage of small molecules and ions (solutes) directly from the cytoplasm of one cell to the cytoplasm of the other.
- This direct cytoplasmic connection facilitates rapid communication and coordinated activity between cells.

[NCERT(2020-21) Class 11th Page No. 102]

Q8 Text Solution:

(C)

Neuroglia make up more than one half the volume of neural tissue.

[NCERT(2020-21) Class 11th Page No.105]

Q9 Text Solution:

(C)

Frogs respire on land and in the water by two different methods. In water, skin acts as aquatic respiratory organ (cutaneous respiration). Dissolved oxygen in the water is exchanged through the skin by diffusion.

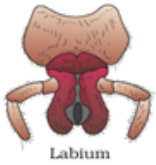
On land, the buccal cavity, skin and lungs act as the respiratory organs. The respiration by lungs is called pulmonary respiration. The lungs are a pair of elongated, pink coloured sac-like structures present in the upper part of the trunk region (thorax). Air enters through the nostrils into the buccal cavity and then to lungs. During aestivation and hibernation gaseous exchange takes place through skin.

[NCERT (2020-21) Class 11th Page No. 82]

Q10 Text Solution:

(C)

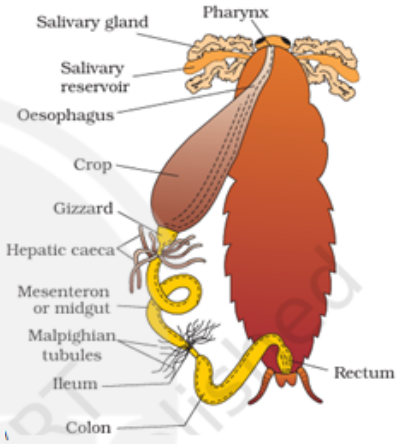
The mouthparts consisting of a labrum (upper lip), a pair of mandibles, a pair of maxillae and a labium (lower lip). A median flexible lobe, acting as tongue (hypopharynx).



[NCERT (2020-21) Class 11th Page No. 112]

Q11 Text Solution:

(D)



[NCERT (2020-21) Class 11th Page No. 113]

Q12 Text Solution:

(C)

Adipose tissue is primarily composed of adipocytes, which are cells specifically adapted for storing large amounts of triglycerides (fats).

[NCERT (2020-21) Class 11th Page No. 103]

Q13 Text Solution:

(D)

A. Touch: The sense of touch is primarily detected by **iii. Sensory papillae** present in the skin.

B. Smell: The sense of smell (olfaction) is detected by specialized receptors located in the **i. Nasal epithelium**.

C. Cranial nerves: These nerves originate directly from the brain (including the brainstem) and are part of the **iv. Peripheral nervous system**.

D. Medulla oblongata: This is the posterior part of the brainstem which contains the **ii. Foramen magnum**, the large opening at the base of the skull through which the spinal cord passes.

[NCERT (2024-25) Class 11th Page No. 83]

Q14 Text Solution:

(C)

Compound eyes, like those of cockroaches, are generally better at detecting movement and have higher sensitivity to light, especially in low-light conditions, compared to human eyes. However, the image formed is less detailed (lower resolution).

[NCERT (2020-21) Class 11th Page No. 112]

Q15 Text Solution:

(D)

The forewings of cockroaches (tegmina) arise from the **mesothorax**, the second thoracic segment. Wings do not arise from the prothorax.

[NCERT (2020-21) Class 11th Page No. 112]

Q16 Text Solution:

(C)

In frogs, the forelimbs and hindlimbs help in swimming and burrowing. Body of a frog is divisible into head and trunk.

[NCERT (2024-25) Class 11th Page No. 81, 82]

Q17 Text Solution:

(C)

The cerebrum is paired (olfactory lobes and cerebral hemispheres), but the diencephalon is a single

Sexual dimorphism, the distinct difference in appearance between males and females of a species, is present in many frog species.

The development is indirect, involving a larval stage known as a tadpole. The tadpole undergoes metamorphosis to form the adult.

[NCERT (2024-25) Class 11th Page No. 84]

Q18 Text Solution:

(B)

In each segment, exoskeleton has hardened plates called sclerites (tergites dorsally and sternites ventrally) that are joined to each other by a thin and flexible articular membrane (arthrodial membrane).

[NCERT(2020-21) Class 11th Page No. 111]

Q19 Text Solution:

(B)

The hind wings of a cockroach are indeed used for flying. They are the primary wings responsible for generating lift during flight. The forewings (tegmina) are mainly protective.

The hind wings arise from the **metathorax**, the third thoracic segment. The forewings (tegmina) arise from the mesothorax.

[NCERT (2020-21) Class 11th Page No. 112]

Q20 Text Solution:

(C)

- The forelimbs of a frog are typically smaller and less muscular, and they have four digits.
- The hindlimbs of a frog are typically larger and more muscular, and they have five digits.

[NCERT(2024-25) Class 11th Page No. -80, 81]

Q21 Text Solution:

(D)

Lymph is a fluid similar to blood plasma but with a lower concentration of proteins. It is derived from interstitial fluid and circulates through the lymphatic system. **Normally, lymph does not contain red blood cells (RBCs).** RBCs are confined to the blood vessels. The presence of RBCs in lymph would indicate a hemorrhage or some pathological condition.

[NCERT(2024-25) Class 11th Page No. 82]

Q22 Text Solution:

(B)

The alimentary canal is short because frogs are carnivores.

Fertilisation is external and takes place in Water.

[NCERT(2024-25) Class 11th Page No. 81, 84]

Q23 Text Solution:

(A)

The respiratory system consists of a network of trachea, that open through 10 pairs of small holes called spiracles present on the lateral side of the body.

[NCERT(2020-21) Class 11th Page No. 103]

Q24 Text Solution:

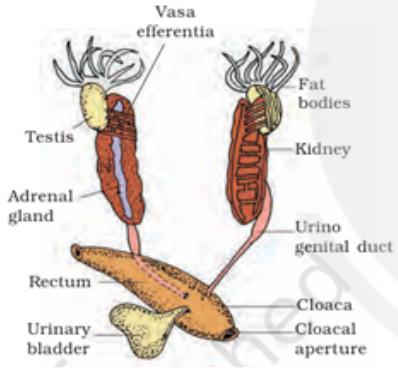
(B)

A.	Testes	II.	4th to 6th abdominal segments
B.	Ovaries	I.	2nd to 6th abdominal segments.
C.	Spermatheca	III.	6th abdominal segment.
D.	Mushroom gland	IV.	6th - 7th abdominal segments.

[NCERT(2020-21) Class 11th Page No. 114]

Q25 Text Solution:

(B)



[NCERT(2020-21) Class 11th Page No. 114]

Q26 Text Solution:

(A)	**Testes** in frogs are	(II)	**Ovoid** shaped structures.
(B)	**Ureters** in male frogs also function as	(I)	**Urinogenital duct**, carrying both urine and sperm.
(C)	**Sinus venosus** is a	(III)	**On the ventral side of a frog's heart**, receiving deoxygenated blood.
(D)	**Conus arteriosus** is a	(IV)	**Triangular structure** on the dorsal side of the frog's heart, from which the arterial trunks arise.

[NCERT(2024-25) Class 11th Page No. 82, 83]

Q27 Text Solution:

The **muscle tissue** that changes the diameter of blood vessels is **smooth muscle**, which is found in the walls of blood vessels.

Smooth muscles are **involuntary, non-striated muscles** that can **contract or relax**, thereby **narrowing (vasoconstriction)** or **widening (vasodilation)** the blood vessels.

Q28 Text Solution:

Neural tissue exerts the greatest control over the body's responsiveness to changing conditions. Neurons are the unit of neural system which are specialized for conducting impulses. The **recoil response** to touch indicates **sensitivity** and **coordination**, which are functions of the **nervous system**. **Neural tissue** is responsible for receiving stimuli and transmitting nerve impulses. In this case, the organism responded to a **touch stimulus** by recoiling, which is a **reflexive response** coordinated by **neural tissue**.

Q29 Text Solution:

- The vascular system of frog is well-developed and closed type.
- Blood vascular system includes heart, blood and blood vessels.
- Heart is a muscular structure situated in the upper part of the body cavity.
- Frogs have a lymphatic system.
- Sinus venosus joins right atrium.

Q30 Text Solution:

Cardiac muscles are striated but involuntary. Cardiac muscles are involuntary but not smooth. In all connective tissues except blood, the cells secrete fibres of structural proteins called

collagen or elastin. Neural tissue exerts the greatest control over the body's responsiveness to changing conditions.

Q31 Text Solution:

On the basis of structural modification of the cells, simple epithelium is further divided into three types. These are (i) Squamous, (ii) Cuboidal, (iii) Columnar

Q32 Text Solution:

Connective tissues are most abundant and widely distributed in the body of complex animals. They are named connective tissues because of their special function of linking and supporting other tissues/organs of the body. Bone is the main tissue that provides structural frame to the body. Blood is the main circulating fluid that helps in the transport of various substances. Dense irregular connective tissue is present in the skin.

Q33 Text Solution:

In males, genital pouch or chamber lies at the hind end of abdomen bounded dorsally by 9th and 10th terga and ventrally by the 9th sternum. It contains dorsal anus, ventral male genital pore and gonapophysis. Males bear a pair of short, thread like anal styles which are absent in females. In both sexes, the 10th segment bears a pair of jointed filamentous structures called anal cerci.

Q34 Text Solution:

The body of arthropods is covered by chitinous exoskeleton. They have organ-system level of organisation. They are bilaterally symmetrical, triploblastic, segmented and coelomate animals. Circulatory system is of open type.

Q35 Text Solution:

Compound eyes (like in insects such as cockroaches) consist of many ommatidia and produce **mosaic vision**, a type of image formation. Septal nephridia are **excretory organs in earthworms**, located in the intersegmental septa. **Osteocytes** are mature bone cells embedded in the bone matrix, responsible for maintaining bone tissue. **Phallomeres** are **male genital structures in cockroaches** used in copulation—hence related to genitalia.

Q36 Text Solution:

Frogs possess a pair of kidneys. Ureters transport urine to the cloaca. The reason describes the physical appearance and location of the kidneys in frogs. The urinary bladder stores urine before excretion. These components form the excretory system in frogs. Kidneys are compact, bean-shaped, deep red, and located dorsally on either side of the vertebral column.

Q37 Text Solution:

Frog shows incomplete double circulation. Larval stage of cockroach is called nymph. Fibroblasts, macrophages and mast cells are present in tissue in which cells and fibres are loosely arranged.

Q38 Text Solution:

Lymph in both frogs and mammals differs from blood because it lacks red blood cells (RBCs) and has fewer proteins than plasma. Frog RBCs are nucleated, unlike mammalian RBCs which are enucleated. Frogs and mammals both belong to the **phylum Chordata** and the **subphylum Vertebrata**, and thus do share **similar structural and functional features** in many of their organ systems (like circulatory, nervous, etc.).

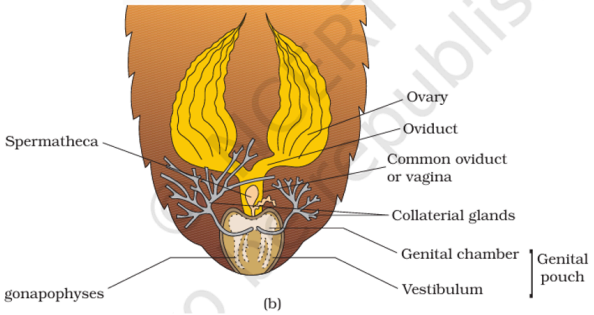
Q39 Text Solution:

Frogs are **carnivores**. Carnivorous animals typically have a **shorter alimentary canal** because **animal food is easier to digest** compared to plant material, which requires more time and specialized structures for breakdown (like a longer gut and cellulose-digesting microbes in herbivores). This is a **well-established biological principle**. Herbivores usually have **longer alimentary canals** to process fibrous plant matter, while carnivores like frogs and lions have **shorter** ones due to their protein-rich, easily digestible diet.

Q40 Text Solution:

Glandular epithelium is a modification of columnar or cuboidal epithelium.

Q41 Text Solution:



Q42 Text Solution:

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

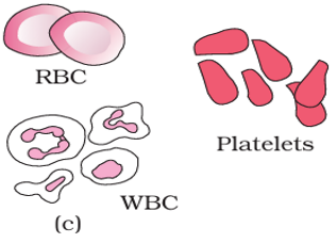
Q43 Text Solution:

Each organ in our body is made of one or more type of tissues. For example, our heart consists of all the four types of tissues, i.e., epithelial, connective, muscular and neural. We also notice, after some careful study that the complexity in organ and organ systems displays certain discernable trend. This discernable trend is called evolutionary trend

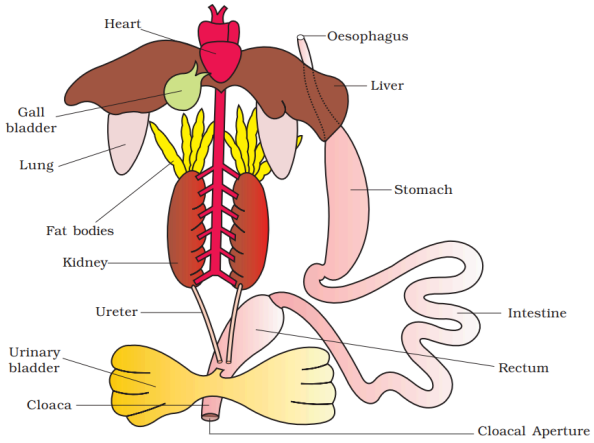
Q44 Text Solution:

The intercellular matrix is arranged in the form of concentric lamellae in bone not in cartilage always.

Q45 Text Solution:



Q46 Text Solution:



Q47 Text Solution:

The exoskeleton is composed of hardened plates called sclerites, which are interconnected by flexible membranes, enabling the cockroach to move efficiently.

The sclerites are the rigid, plate-like structures that form the exoskeleton, while the articular membranes (arthrodial membranes) are the flexible, non-sclerotized regions that connect these sclerites, allowing for movement.

Q48 Text Solution:

Male cockroaches have **a pair of testes** (not a single testis), and they are located in the **4th to 6th abdominal segments. Sperms are stored in seminal vesicles in males, but spermatheca is a female reproductive structure used to store sperm received from the male. Therefore, this statement mixes up male and female structures. Cockroaches possess compound eyes, which provide mosaic vision. This type of vision is known for high sensitivity to movement but low resolution. The brain of the cockroach is formed by the supra-oesophageal ganglion in the head. The sub-oesophageal ganglion lies below the oesophagus and is responsible for controlling mouthparts and neck muscles, but it is not the brain.**

Q49 Text Solution:

The frog never drinks water but absorb it through the skin. The nymph grows by moulting about 13 times to reach the adult form. The next

to last nymphal stage has wing pads but only adult cockroaches have wings.

Q50 **Text Solution:**

The collateral glands are paired, highly branched tubular glands located dorsally to the genital pouch in female cockroaches. The secretions from these glands form the rigid, protective oothecal case around fertilized eggs, ensuring their safety during development.

The left collateral gland is larger and secretes a protein-rich secretion, while the right gland secretes a glucoside that aids in hardening the secretion, contributing to the formation of the oothecal case. Both glands open into the genital chamber through a common duct, releasing their secretions into the chamber.