

Structural Organisation in Animals

1. The Cockroach is : **(2023)**

- (a) Ammonotelic only
- (b) Uricotelic only
- (c) Ureotelic only
- (d) Ureotelic and Uricotelic

2. **Statement I** : In cockroach, the forewings are transparent and prothoracic in origin.

Statement II : In cockroach, the hind wings are opaque, leathery and mesothoracic in origin. **(2023)**

- (a) Statement I is correct but statement II is false
- (b) Statement I is incorrect but statement II is true
- (c) Both statement I and statement II are true
- (d) Both statement I and Statement II are false.

3. Match List-I with List-II. **(2023)**

List -I		List -II	
(A)	Columnar epithelium	(I)	Ducts of glands
(B)	Ciliated epithelium	(II)	Inner lining of stomach and intestine
(C)	Squamous epithelium	(III)	Inner lining of branchales
(D)	Cuboidal epithelium	(IV)	Endothelium

Choose the correct answer from the options given below:]

- (a) A-III, B-II, C-I, D-IV
- (b) A-III, B-II, C-IV, D-I
- (c) A-II, B-III, C-I, D-IV
- (d) A-II, B-III, C-IV, D-I

4. **Statement I** : Ligaments are dense irregular tissue.

Statement II : Cartilage is dense regular tissue. **(2023)**

- (a) Statement I is correct but statement II is false
- (b) Statement I is incorrect but statement II is true
- (c) Both statement I and statement II are true
- (d) Both statement I and Statement II are false.

5. Match List I with List II. **(2023)**

List - I		List – II	
(A)	Mast cells	(I)	Ciliated epithelium
(B)	Inner surface of branchiole	(II)	Areolar connective tissue
(C)	Blood	(III)	Cuboidal epithelium
(D)	Tubular parts of nephron	(IV)	Specialised connective tissue

Choose the correct answer from the options give below:

- (a) A-II, B-III, C-I, D-IV
- (b) A-II, B-I, C-IV, D-III
- (c) A-III, B-IV, C-II, D-I
- (d) A-I, B-II, C-IV, D-III

6. In cockroach, excretion is brought about by – **(2023)**

- (A) Phallic gland
- (B) Ureose gland
- (C) Nephrocytes
- (D) Fat body
- (E) Collateral glands

Choose the correct answer from the options given below :

- (a) A, B and E only
- (b) B, C and D only
- (c) B and D only
- (d) A and E only

7. Which of the following is characteristic feature of cockroach regarding sexual dimorphism? **(2023)**

- (a) Presence of anal styles
- (b) Presence of sclerites
- (c) Presence of anal cerci
- (d) Dark brown body colour and anal cerci

8. Which of the following types of epithelium is present in the bronchioles and Fallopian tubes? **(2022)**

- (a) Stratified squamous epithelium
- (b) Simple squamous epithelium
- (c) Simple columnar epithelium
- (d) Ciliated epithelium

9. Match List-I with List-II regarding the organs of Cockroach: **(2022)**

	List - I		List - I
(A)	Crop	(I)	Malpighian tubules
(B)	Proventriculus	(II)	Malpighian tubules
(C)	Hepatic caecae	(III)	Malpighian tubules
(D)	Malpighian tubules	(IV)	Storage of food

Choose the correct answer from the options given below :

- (a) A-I, B-IV, C-III, D-II
 (b) A-IV, B-I, C-II, D-III
 (c) A-III, B-II, C-I, D-IV
 (d) A-II, B-IV, C-I, D-III
10. Choose the correct statements: **(2022)**
 (a) Bones support and protect softer tissues and organs
 (b) Weight bearing function is served by limb bones
 (c) Ligament is the site of production of blood cells.
 (d) Adipose tissue is specialised to store fats.
 (e) Tendons attach one bone to another.
 Choose the most appropriate answer from the options given below:
 (a) (A), (B) and (E) only
 (b) (A), (B) and (D) only
 (c) (B), (C) and (E) only
 (d) (A), (C) and (D) only
11. Excretion in cockroach is performed by all, EXCEPT: **(2022)**
 (a) Hepatic caeca
 (b) Urecose glands
 (c) Malpighian tubules
 (d) Fat body
12. In which of the following animals, digestive tract has additional chambers like crop and gizzard? **(2022)**
 (a) Corvus, Columba, Chameleon
 (b) Bufo, Balaenoptera, Bangarus
 (c) Catla, Columba, Crocodilus
 (d) Pavo, Psittacula, Corvus
13. Pavo (Peacock), Psittacula (Parrot), Corvus (Crow) and Columba (Pigeon) are birds. **(2022)**
 (a) Blood
 (b) Adipose tissue

- (c) Cartilage
 (d) Neuroglia

14. Tegmina in cockroach, arises from **(2022)**
 (a) Prothorax
 (b) Mesothorax
 (c) Metathorax
 (d) Prothorax and Mesothorax

15. Match List - I with List - II **(2022)**

List - I		List - II	
(A)	Bronchioles	(I)	Dense Regular Connective Tissue
(B)	Goblet Cell	(II)	Losse Connective Tissue
(C)	Tendons	(III)	Glandular Tissue
(D)	Adipose Tissue	(IV)	Ciliated Epithelium

Choose the correct answer from the options given below:

- (a) A-IV, B-III, C-I, D-II
 (b) A-I, B-II, C-III, D-IV
 (c) A-II, B-I, C-IV, D-III
 (d) A-III, B-IV, C-II, D-I
16. Which of the following characteristic is incorrect with respect to cockroach? **(2021)**
 (a) Hypopharynx lies within the cavity enclosed by the mouth parts
 (b) In females, 7th-9th sterna together form a genital pouch
 (c) 10th abdominal segment in both sexes, bears a pair of anal cerci
 (d) A ring of gastric caeca is present at the junction of midgut and hind gut
17. Which of the following statement is wrongly represent the nature of smooth muscle? **(2021)**
 (a) They are involuntary muscles
 (b) Communication among the cells is performed by intercalated discs
 (c) These muscles are present in the wall of blood vessels
 (d) These muscle have no striations
18. 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 **(2021)**

- (a) Tight junctions and Gap junctions, respectively
 (b) Adhering junctions and Tight junctions, respectively
 (c) Adhering junctions and Gap junctions, respectively
 (d) Gap junctions and Adhering junctions, Respectively
19. Following are the statements about prostomium of earth-worm **(2021)**
 A. It serves as a covering for mouth
 B. It helps to open cracks in the soil into which it can crawl
 C. It is one of the sensory structures
 D. It is the first body segment
- Choose the correct answer from the options given below.
 (a) A, B and D are correct
 (b) A, B, C and D are correct
 (c) B and C are correct
 (d) A, B and C are correct
20. Cuboidal epithelium with brush border of microvilli is found in **(2020)**
 (a) Ducts of salivary glands
 (b) Proximal convoluted tubule of nephron
 (c) Eustachian tube
 (d) Lining of intestine
21. If the head of cockroach is removed, it may live for few days because **(2020)**
 (a) The cockroach does not have nervous system
 (b) The head holds a small proportion of a nervous system while the rest is situated along the ventral part of its body
 (c) The head holds a 1/3rd of a nervous system while the rest is situated along the dorsal part of its body
 (d) The supra-oesophageal ganglia of the cockroach are situated in ventral part of abdomen
22. Goblet cells of alimentary canal are modified from **(2020)**
 (a) Columnar epithelial cells
 (b) Chondrocytes
 (c) Compound epithelial cells
 (d) Squamous epithelial cells
23. In cockroach, identify the parts of the foregut in correct sequence **(2020 Covid Re-NEET)**
 (a) Mouth → Crop → Pharynx → Oesophagus → Gizzard

- (b) Mouth → Gizzard → Crop → Pharynx → Oesophagus
 (c) Mouth → Pharynx → Oesophagus → Crop → Gizzard
 (d) Mouth → Oesophagus → Pharynx → Crop → Gizzard
24. Match the following columns with reference to cockroach and select the correct option **(2020 Covid Re-NEET)**

Column-I		Column-II	
1.	Grinding of the food particles	(i)	Hepatic caecae
2.	Secrete gastric juice	(ii)	10th segment
3.	10 pairs	(iii)	Proventriculus
4.	Anal cerci	(iv)	Spiracles
		(v)	Alary muscles

1 2 3 4

- (a) (iv) (iii) (v) (ii)
 (b) (i) (iv) (iii) (ii)
 (c) (ii) (iii) (i) (iv)
 (d) (iii) (i) (iv) (ii)
25. Select the incorrectly matched pair from following **(2020 Covid Re-NEET)**
 (a) Neurons - Nerve cells
 (b) Fibroblast - Areolar tissue
 (c) Osteocytes - Bone cells
 (d) Chondrocytes - Smooth muscle cells
26. Ciliated epithelial cells are required to move particles or mucus in a specific direction. In humans, these cells are mainly present in **(2019)**
 (a) Bile duct and Bronchioles
 (b) Fallopian tubes and Pancreatic duct
 (c) Eustachian tube and Salivary duct
 (d) Bronchioles and Fallopian tubes
27. Select the correct sequence of organs in the alimentary canal of cockroach starting from mouth **(2019)**
 (a) Pharynx → Oesophagus → Crop → Gizzard → Ileum → Colon → Rectum
 (b) Pharynx → Oesophagus → Gizzard → Crop → Ileum → Colon → Rectum
 (c) Pharynx → Oesophagus → Gizzard → Ileum → Crop → Colon → Rectum
 (d) Pharynx → Oesophagus → Ileum → Crop → Gizzard → Colon → Rectum

28. Which of the following feature is used to identify a male cockroach from a female cockroach? **(2018)**
- Presence of a boat shaped sternum on the 9th abdominal segment
 - Presence of caudal styles
 - Forewings with darker tegmina
 - Presence of anal cerci
29. Select the correct route for the passage of sperms in male frogs **(2017)**
- Testes → Bidder's canal → Kidney → Vasa efferentia → Urinogenital duct → Cloaca
 - Testes → Vasa efferentia → Kidney → Seminal Vesicle → Urinogenital duct → Cloaca
 - Testes → Vasa efferentia → Bidder's canal → Ureter → Cloaca
 - Testes → Vasa efferentia → Kidney → Bidder's canal → Urinogenital duct → Cloaca
30. Which of the following structures does not open into the genital chamber of female cockroaches? **(2017)**
- A pair of collateral glands
 - A single median oviduct
 - Spermatheca
 - A pair of anal cerci
31. Select incorrect option with respect to features present in three animals **(2017)**
- | | Characters | Cockroach | Earthworm | Frog |
|-----|-----------------------|------------------|------------------|-------------|
| (a) | Development | Direct | Indirect | Indirect |
| (b) | Blood vascular system | Open | Closed | Closed |
| (c) | Body surface | Dry | Moist | Moist |
| (d) | Eyes | Compound | Absent | Simple |
32. Smooth muscles are **(2016 - II)**
- Involuntary, cylindrical, striated
 - Voluntary, spindle-shaped, uninucleate
 - Involuntary, fusiform, non-striated
 - Voluntary, multinucleate, cylindrical
33. In male cockroaches, sperms are stored in **(2016 - II)**
- Testes
 - Vas deferens

- Seminal vesicles
 - Mushroom glands
34. Which of the following feature is not present in *Periplaneta americana*? **(2016 - I)**
- Schizocoelom as body cavity
 - Indeterminate and radial cleavage during embryonic development
 - Exoskeleton composed of N-acetyl glucosamine
 - Metamerically segmented body
35. Which type of tissue correctly matches with its location **(2016 - I)**
- | | Tissue | Location |
|-----|-------------------------|-------------------|
| (a) | Smooth muscle | Wall of intestine |
| (b) | Areolar tissue | Tendons |
| (c) | Transitional epithelium | Tip of nose |
| (d) | Cuboidal epithelium | Lining of stomach |
36. The terga, sterna and pleura of cockroach body are joined by **(2015)**
- Arthrodistal membrane
 - Cartilage
 - Cementing glue
 - Muscular tissue
37. The body cells in cockroach discharge their nitrogenous waste in the haemolymph mainly in the form of **(2015 Re)**
- Potassium urate
 - Urea
 - Calcium carbonate
 - Ammonia
38. Which of the following is not a function of the skeletal system? **(2015 Re)**
- Storage of minerals
 - Production of body heat
 - Locomotion
 - Production of erythrocytes
39. Function of the gap junction is to **(2015 Re)**
- Facilitate communication between adjoining cells by connecting the cytoplasm for rapid transfer of ions, small molecules and some large molecules
 - Separate two cells from each other
 - Stop substance from leaking across a tissue
 - Performing cementing to keep neighboring cells together
40. Choose the correctly matched pair **(2014)**
- Cartilage - Loose connective tissue
 - Tendon - Specialised connective tissue

- (c) Adipose tissue - Dense connective tissue
 - (d) Areolar tissue - Loose connective tissue
41. Choose the correctly matched pair **(2014)**
- (a) Inner surface of bronchioles - Squamous epithelium
 - (b) Inner lining of salivary ducts - Ciliated epithelium
 - (c) Moist surface of buccal cavity - Glandular epithelium
 - (d) Tubular parts of nephrons - Cuboidal Epithelium
42. Select the correct option with respect to cockroaches **(2013)**
- (a) Malpighian tubules convert nitrogenous wastes into urea
 - (b) Males bear short anal styles not present in females
 - (c) Nervous system comprises of a dorsal nerve cord and ten pairs of ganglia
 - (d) Forewings are tegmina which are used in Flight
43. What external changes are visible after the last moult of a cockroach nymph? **(2013)**
- (a) Labium develops
 - (b) Mandibles become harder
 - (c) Anal cerci develop
 - (d) Both fore wings and hind wings develop

Answer Key

S1. Ans. (b)

S2. Ans. (d)

S3. Ans. (d)

S4. Ans. (a)

S5. Ans. (a)

S6. Ans. (b)

S7. Ans. (a)

S8. Ans. (d)

S9. Ans. (b)

S10. Ans. (b)

S11. Ans. (a)

S12. Ans. (d)

S13. Ans. (d)

S14. Ans. (b)

S15. Ans. (a)

S16. Ans. (d)

S17. Ans. (b)

S18. Ans. (a)

S19. Ans. (b)

S20. Ans. (b)

S21. Ans. (b)

S22. Ans. (a)

S23. Ans. (c)

S24. Ans. (d)

S25. Ans. (d)

S26. Ans. (d)

S27. Ans. (a)

S28. Ans. (b)

S29. Ans. (d)

S30. Ans. (d)

S31. Ans. (a)

S32. Ans. (c)

S33. Ans. (c)

S34. Ans. (b)

S35. Ans. (a)

S36. Ans. (a)

S37. Ans. (a)

S38. Ans. (b)

S39. Ans. (a)

S40. Ans. (d)

S41. Ans. (d)

S42. Ans. (b)

S43. Ans. (d)

Solutions

- S1. Ans.(b)
Cockroaches are uricotelic organisms. The nature of the nitrogenous waste excreted can be species-specific and is often influenced by the organism's environment and water availability.
- S2. Ans.(d)
The first pair of wings (forewings or tegmina) are not transparent and prothoracic in origin, as stated in Statement I. Instead, they are opaque, dark, leathery and originate from the mesothorax.
- S3. Ans.(d)
Columnar epithelium : This type of epithelium consists of tall, slender and column-like cells. It's found in the inner lining of the stomach and intestine where it aids in secretion and absorption. So, matches with .Ciliated epithelium : These are typically columnar or cuboidal cells that have cilia (small hair-like projections) on their surface. Ciliated epithelium is usually found in the bronchioles (air passages in the lungs) and in the fallopian tubes in females. The cilia help to move mucus and other substances. So, matches with .Squamous epithelium : Squamous cells are thin and flat, similar in shape to fish scales (the word "squamous" means scaly). This type of epithelium forms the endothelium (the lining of the heart, blood vessels, and lymphatic vessels). So, matches with. Cuboidal epithelium : These cells are cube-shaped and are most commonly found in the ducts of glands and kidney tubules, where they assist with secretion and absorption. So, matches with .
- S4. Ans.(a)
The correct answer is Option A : Both Statement I and Statement II are false. On the other hand, cartilage is a type of specialized connective tissue that is not classified as dense.
- S5. Ans.(d)
- Mast cells (A) : These are a type of white blood cell that is part of the immune system.
Inner surface of bronchiole (B) : The bronchioles are small airways in the respiratory tract that lead to the alveoli (tiny air sacs in the lungs).
- Blood (C) : This is a specialized type of connective tissue.
- Tubular parts of nephron (D) : Nephrons are the functional units of the kidney, responsible for filtering blood and creating urine.
- S6. Ans.(d)
Nephrocytes are large, colourless, ovoid, binucleate cells attached to the dorsal diaphragm in the body cavity. Collateral gland is the structure of female reproductive system of cockroach and it secretes the hard egg-case or ootheca around fertilised eggs.
- S7. Ans.(d)
Is the correct answer because anal styles are present in male cockroaches and absent in female cockroaches.
- S8. Ans.(d)
Is the correct answer as ciliated epithelium is mainly present in the inner lining of hollow organs like bronchioles and fallopian tubes.
- S9. Ans.(b)
(a) Crop – Responsible for storage of food
(b) Proventriculus – Grinding the food particles
(c) Hepatic caecae – Secretion of digestive juice
(d) Malpighian tubules – Removal of nitrogenous waste
- S10. Ans.(b)
• Bones are the hardest tissue of our body that support and protect softer tissues and organs.

- Limb bones serve weight bearing function.

- Adipose tissue is a type of loose connective tissue specialised to store fats.

S11. Ans.(a)

Is correct answer because hepatic caeca are responsible for secretion of digestive juices in cockroach and it does not participate in excretion. Ureco-se glands in male cockroach, Malpighian tubules and fat bodies in both male and female cockroach are considered as excretory structures.

S12. Ans.(d)

Pavo (Peacock), Psittacula (Parrot), Corvus (Crow) and Columba (Pigeon) are birds.

S13. Ans.(d)

Neuroglia are the supportive cells of nervous tissue. They make up more than half the volume of neural tissue. Neurons, the unit of neural system are excitable cells.

S14. Ans.(b)

Option (b) is the correct answer because tegmina or forewings (the first pair of wings) in cockroach arises from mesothorax.

S15. Ans.(a)

Ciliated epithelium is mainly present in the inner surface of hollow organs like bronchioles and fallopian tubes. The function is to move particles or mucus in a specific direction over the epithelium. Some of the columnar or cuboidal cells get specialised for secretion and are called glandular epithelium. Goblet cells are unicellular glands. Tendons are dense regular connective tissues. They attach skeletal muscles to bones. Adipose tissue is a type of loose connective tissue located mainly beneath the skin. The cells of this tissue are specialised to store fats.

S16. Ans.(d)

A ring of gastric caeca is present at the junction of foregut and midgut.

S17. Ans.(b)

Communication among the cells performed by intercalated discs is present in cardiac cells.

S18. Ans.(a)

- Tight junction helps to stop the leakage of the substance across a tissue.
- Gap junction facilitates communication with neighbouring cells via rapid transfer of ions and molecule.

S19. Ans.(d)

Prostomium serves as covering for mouth; helps to open cracks in the soil into which it can crawl; sensory structures,

S20. Ans.(b)

Microvilli can be found in the cuboidal epithelium of the proximal convoluted tubule (PCT) of the nephron in the kidney.

S21. Ans.(b)

A portion of the nervous system is located in the cockroach's head while the rest is located along the ventral (belly-side) region of its body. As a result, even if the cockroach's head is removed, it can live for up to a week.

S22. Ans.(a)

Goblet cells in the alimentary canal's mucosal epithelium release mucus that aids in lubrication. These are made from columnar epithelial cells that have been modified.

S23. Ans.(c)

The mouth opens into a short tubular pharynx which leads to the oesophagus, a tiny tube conduit. This expands into a sac-like structure called a crop which is used to store food. Gizzard or proventriculus comes after the crop.

S24. Ans.(d)

- The gizzard, also known as the proventriculus, aids in the crushing of food particles.

- At the foregut-midgut junction, hepatic caecae can be found.
- The cockroach's 10th segment bears a pair of jointed filamentous filaments known as anal cerci in both sexes.
- Cockroach has 12 pairs of alary muscles that are connected to the heart and circulatory system.
- The respiratory system is made up of a network of trachea that open through ten pairs of small openings on the body's lateral side called spiracles.

S25. Ans.(d)

Cartilage's intercellular substance is solid and pliable and it resists compression. This tissue's cells (chondrocytes) are encased in small cavities within the matrix they secrete.

S26. Ans.(d)

Ciliated epithelium lines the bronchioles and fallopian tubes to transfer particles or mucus in a certain direction across the epithelium.

S27. Ans.(a)

Starting with the mouth, the correct order of organs in the cockroach alimentary canal is: Pharynx-Oesophagus-Crop-Gizzard-Ileum-Colon-Rectum

S28. Ans.(b)

A pair of tiny, unjointed anal styles, also known as caudal styles can be found in the 9th sternum of males' abdomen.

S29. Ans.(d)

Sperms in male frogs migrate in the following manner:

Testes → Vasa efferentia → Kidney → Bidder's canal → Urinogenital duct → Cloaca

S30. Ans.(d)

The anterior region of the vaginal pouch contains gonopores, spermathecal pores and collateral gland apertures.

S31. Ans.(a)

Earthworm development is direct, i.e. no larva is generated.

S32. Ans.(c)

Smooth muscles are referred to as "involuntary" since they cannot be controlled directly. Smooth muscle fibres have no striations and taper at both ends (fusiform).

S33. Ans.(c)

Sperms are kept in seminal vesicles and cemented together in spermatophores which are expelled during copulation.

S34. Ans.(b)

Periplaneta americana does not have indeterminate or radial cleavage during embryonic development (cockroach).

S35. Ans.(a)

- Areolar tissue present under the skin.
- Smooth muscle tissue lines the inside walls of internal organs such as blood vessels, stomachs, and intestines.
- Cuboidal epithelium is found in gland ducts and tubular sections of nephrons in the kidneys.
- Transitional epithelium is found in ureter, urinary bladder.

S36. Ans.(a)

Exoskeleton of *Periplaneta americana* has firm plates termed sclerites (tergites dorsally and sternites ventrally) that are linked to each other by a thin and flexible articular membrane in each segment (Arthrodial membrane).

S37. Ans.(a)

Insects including cockroach excrete nitrogenous waste in the form of soluble potassium urate which is released into the haemolymph and taken up by the cells lining the malpighian tubule.

S38. Ans.(b)

Heat generation is linked to respiration rather than the skeletal system.

S39. Ans.(a)

Gap junctions allow cells to communicate by connecting the cytoplasm of neighbouring cells allowing for the rapid transport of ions, small molecules and occasionally large molecules.

S40. Ans.(d)

- Tendon - Tissue with a high density of connective tissue.
- Cartilage is a type of connective tissue that is specialised.
- Areolar tissue and adipose tissue are two types of loose connective tissue.

S41. Ans.(d)

Cuboidal epithelium in the tubular region of the nephron. Compound epithelium covers the moist surface of the buccal cavity and the inner lining of the salivary ducts. Ciliated epithelium lines the inner surface of bronchioles.

S42. Ans.(b)

On the 9th abdominal segments, males have paired anal styles while females do not have.

S43. Ans.(d)

Wing pads are present in the last nymphal stage, however only adult cockroaches have wings.