Question 1:

Answer in one word or one line.

(i) Give the common name of *Periplaneta americana.*

(ii) How many spermathecae are found in earthworm?

(iii) What is the position of ovaries in the cockroach?

(iv) How many segments are present in the abdomen of cockroach?

(v) Where do you find malphigian tubules?

Answer

(i) The common name of *Periplaneta americana* is the American cockroach.

(ii) Four pairs of spermathecae are present in earthworms. They are located between sixth and the ninth segments. They help in receiving and storing the spermatozoa during copulation.

(iii) In a cockroach, the pair of ovaries is located between 12^{th} and 13^{th} abdominal segments.

(iv) In both sexes, the abdomen of a cockroach consists of ten segments.

(v) Malphigian tubules are main excretory organs of cockroaches. They form a part of the alimentary canal.

Question 2:

Answer the following:

(i) What is the function of nephridia?

(ii) How many types of nephridia are found in earthworm based on their location?

Answer

(i) Nephridia are segmentally arranged excretory organs present in earthworms.

(ii) On the basis of their location, three types of nephridia are found in earthworms. They are:

(a) Septal nephridia:_These are present on both sides of the inter-segmental septa behind the 15^{th} segment. They open into the intestines.

(b) Integumentary nephridia:_These lie attached to the body wall from the third segment to the last segment, which opens on the body surface.

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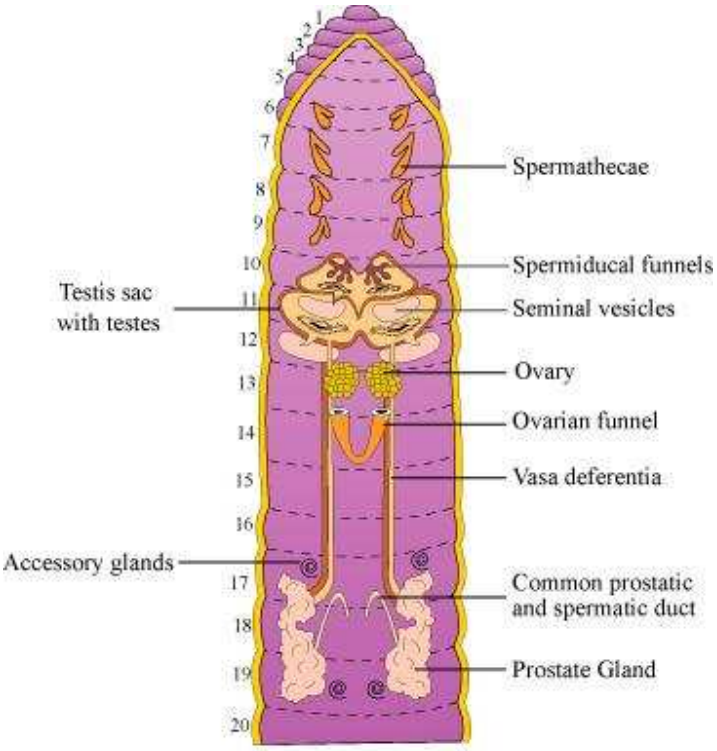
(c) Pharyngeal nephridia: These are present as three paired tufts in fourth, fifth, and sixth segments.

Question 3:

Draw a labelled diagram of the reproductive organs of an earthworm.

Answer



Reproductive system of Earthworm

Question 4:

Draw a labelled diagram of alimentary canal of a cockroach.

Answer

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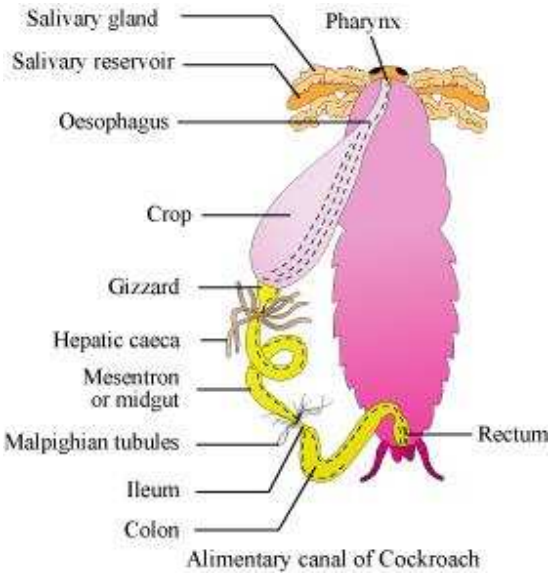

Alimentary canal of Cockroach

Question 5:

Distinguish between the following

(a) Prostomium and peristomium

(b) Septal nephridium and pharyngeal nephridium

Answer

(a)

Prostomium	**Peristomium**
Prostomium is a small fleshy lobe, which overhangs the mouth of an earthworm. It helps the organism push into the soil and is sensory in function.	The first body segment in the earthworm is called the peristomium. It surrounds the mouth opening.

(b)

Septal nephridium	**Pharyngeal nephridium**

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They are present on both sides of inter-segmental septa behind the 15th segment. They open into the intestines.	They are present as three paired tufts in the fourth, fifth, and sixth segments.

Question 6:

What are the cellular components of blood?

Answer

Components of blood include erythrocytes (RBCs), leucocytes (WBCs), and thrombocytes (platelets). These components form 45% of blood. They are suspended in the remaining fluid portion, called plasma.

Mammalian erythrocytes are biconcave, coloured cells devoid of a nucleus. They help in transporting respiratory gases.

Leucocytes or white blood cells are nucleated cells. They can be divided into two types, granulocytes (neutrophils, eosinophils, and basophils) and agranulocytes (lymphocytes and monocytes). They help fight against various disease-causing germs entering the body.

Thrombocytes are cell fragments produced from megarkaryocytes of the bone. They play a major role during blood coagulation.

Question 7:

What are the following and where do you find them in animal body

(a) Chondriocytes

(b) Axons

(c) Ciliated epithelium

Answer

Chondriocytes:

They are cells of cartilages, and are present in small cavities within the matrix secreted by them.

Axons:

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They are long, slender projections of neurons that help in carrying nerve impulses from the neuron body. Axons aggregate in bundles which make up the nerves.

Ciliated epithelium:

It consists of simple columnar or cuboidal epithelium with cilia on their free surfaces. It is present on the inner surface of the oviducts and bronchioles. It helps in the movement of eggs or mucus in specific directions.

Question 8:

Describe various types of epithelial tissues with the help of labelled diagrams.

Answer

Epithelial tissue lines the surface of a body and forms a protective covering. Epithelium cells are packed tightly together with little intercellular matrix. Epithelial tissue in the body is of two types.

(a) Simple epithelium: It consists of a single layer of cells where cells are in direct contact with the basement membrane. It is further sub-divided into the following types:

(i) Simple squamous epithelium: It consists of a single layer of flat cells with irregular boundaries. It is found in the walls of the blood vessels and in the lining of alveoli.

(ii) Simple cuboidal epithelium: It consists of a single layer of cube-like cells. It is present in regions where secretion and absorption of substances takes place such as the proximal convoluted tubule region of the nephron.

(iii) Simple columnar epithelium: It consists of a single layer of tall, slender cells with their nuclei present at the base of the cells. They may bear micro-villi on the free surfaces. Columnar epithelium forms the lining of the stomach and intestines, and is involved in the function of secretion and absorption.

(iv) Ciliated epithelium: It consists of columnar or cuboidal cells with cilia on their free surfaces. They are present in bronchioles and oviducts from where they direct mucus and eggs in specific directions.

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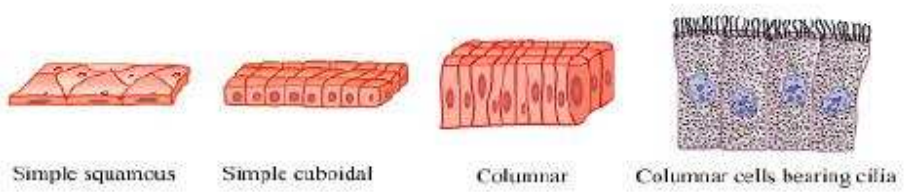
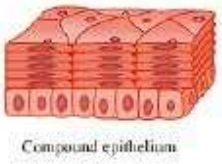
(v) Glandular epithelium:It consists of columnar or cuboidal cells involved in the secretion of substances. Glands are of two types, unicellular glands (goblet cells of the alimentary canal) and multicellular glands (salivary glands). They can be classified as exocrine (ductless glands) and endocrine glands (duct glands) by the method through which they release enzymes.



(b)



Compound epithelium: It consists of many layers of cells. It is involved mainly in the function of providing protection and has a limited role in secretion and absorption. Examples of compound epithelium include the dry surface of the skin or moist inner lining of the buccal cavity, pharynx, pancreatic ducts, and the inner lining of ducts of salivary glands.

Question 9:

Distinguish between

(a) Simple epithelium and compound epithelium.

(b) Cardiac muscle and striated muscle

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(c) Dense regular and dense irregular connective tissues

(d) Adipose and blood tissue

(e) Simple gland and compound gland

Answer

(a)

Simple epithelium	**Compound epithelium**
1. It is composed of only one layer of cells. **2.** It is mainly involved in the function of absorption and secretion. **3.** It is present in the lining of the stomach, intestine.	**1.** It is composed of many layers of cells. **2.** It is mainly involved in the function of protection and has a limited role in absorption and secretion. **3.** It is present in the lining of the pharynx and buccal cavity.

(b)

Cardiac muscles	**Striated muscles**
1. They are involuntary in function. **2.** They are multi-nucleate and branched. **3.** They are found only in the heart.	**1.** They are voluntary in function. **2.** They are multi-nucleate and unbranched. **3.** They are found only in triceps, biceps, and limbs.

(c)

Dense regular connective tissues	**Dense irregular connective tissues**

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1. In dense regular connective tissues, collagen fibres are present in rows between parallel boundless fibres. **2.** They are present in tendons and ligaments.	1. In dense irregular connective tissues, fibres are arranged irregularly. **2.** They are present in the skin.

(d)

Adipose tissue	**Blood tissue**
1. It is composed of collagen fibres, elastin fibres, fibroblasts, macrophages, and adipociytes. **2.** It helps in the synthesis, storage, and metabolism of fats. **3.** It is present beneath the skin.	**1.** It is composed of RBCs, WBCs, platelets, and plasma. **2.** It helps in the transportation of food, wastes, gases, and hormones. **3.** It is present in the blood vessels.

(e)

Simple glands	**Compound glands**
1. They contain isolated glandular cells. **2.** They are unicellular. **3.** Examples include goblet cells of the alimentary canal.	**1.** They contain a cluster of secretory cells. **2.** They are multicellular. **3.** Examples include salivary glands.

Question 10:

Mark the odd one in each series:

(a) Areolar tissue; blood; neuron; tendon

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(b) RBC; WBC; platelets; cartilage

(c) Exocrine; endocrine; salivary gland; ligament

(d) Maxilla; mandible; labrum; athorax; coxa

Answer

(a) Areolar tissue, blood, and tendons are examples of connective tissues. Neuron is an example of neural tissue.

(b) RBCs, WBCs, and platelets are the three most important components of blood. Cartilage is therefore, the odd one out.

(c) Exocrine, endocrine, and salivary glands are examples of simple glandular epithelium. Ligament is a connective tissue.

(d) Maxilla, mandible, and labrum are mouthparts of a cockroach. Antennae, on the other hand, are present in the head region of cockroaches.

(e) Protonema forms the developmental stage in the life cycle of a moss. Mesothorax, metathorax, and coxa are parts or segments present in the legs of a cockroach.

Question 11:

Match the terms in column **I** with those in column **II**:

Column I	**Column II**
(a) Compound epithelium	(i) Alimentry canal
(b) Compound eye	(ii) Cockroach
(c) Septal nephridia	(iii) Skin
(d) Open circulatory system	(iv) Mosaic vision
(e) Typhlosole	(v) Earthworm
(f) Osteocytes	(vi) Phallomere
(g) Genitalia	(vii) Bone

Answer

Column I	**Column II**

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(a) Compound epithelium	(iii) Skin
(b) Compound eye	(iv) Mosaic vision
(c) Septal nephridia	(v) Earthworm
(d) Open circulatory system	(ii) Cockroach
(e) Typhlosole	(i) Alimentary canal
(f) Osteocytes	(vii) Bone
(g) Genitalia	(vi) Phallomere

Question 12:

Mention briefly about the circulatory system of earthworm

Answer

Earthworms (*Pheretima*) have closed blood vascular systems, which consists of the heart, blood vessels, and capillaries. The heart pumps blood for circulating it in one direction. Blood is supplied by smaller blood cells to the gut nerve cord and the body wall. Blood glands are present in the 4^{th}, 5^{th}, and 6^{th} segments, which produce blood cells and haemoglobin dissolved in blood plasma. Blood cells in earthworms are phagocytic in nature.

Question 13:

Draw a neat diagram of digestive system of frog.

Answer

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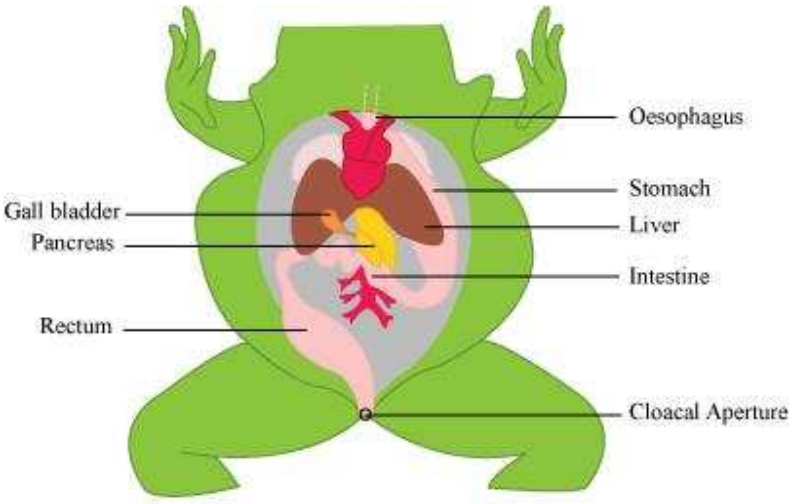

Digestive system of Frog

Question 14:

Mention the function of the following

(a) Ureters in frog

(b) Malpighian tubules

(c) Body wall in earthworm

Answer

(a) Ureters in frogs: A ureter acts as a urinogenital duct, which carries sperms along with urine in male frogs.

(b) Malphigian tubules: Malphigian tubules are excretory organs in cockroaches.

(c) Body wall in earthworms: In earthworms, the body wall consists of muscle layers. It helps in movement and burrowing.

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Chapter-7

STRUCTURAL ORGANISATION IN ANIMALS

POINTS TO REMEMBER

Tissue: A group of one or more types of cells along with intercellular substance which perform one on more specific functions:-

Simple epithelium : is composed of a single layer of cells resting on a basement membrane.

Compound epithelium : consists of two or more cell layers and has protective function.

Areolar tissue : is a type of loose connective tissue present beneath the skin.

Adipose tissue : is a type of loose connective tissue which has cells specialised to store fats.

Neuroglia : A delicate connective tissue which supports and binds together the nerve tissue in the Central Nervous Tissue.

Malpighian tubules : Yellow coloured thin, filamentous tubules present at the junction of midgut and hindgut in cockroach; helps in excretion.

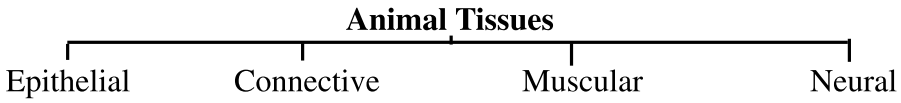
Uricotelic : Animals which excrete nitrogenous waste in the form of uric acid.

Tight junctions : Plasma membranes of adjacent cells are fused at intervals. They help to stop substances from leaking across a tissue.

Adhering junctions : Perform cementing function to keep neighbouring cells together.

Gap junction : Facilitate the cells to communicate with each other by connecting the cytoplasm of adjoining cells for rapid transfer of ions, small molecules and sometimes big molecules.

Types of Fundamental Animal Tissues			
S.No.	**Type**	**Location**	**Functions**
1.	Epithelial Tissues	Free Surfaces	Protection, Secretion, Excretion, bsorption, Sensory and reproduction
2.	Connective Tissues	Inside body its organs, other tissues and below skin.	Holding or binding, support, transport and circulation, protection and storage.
3.	Muscular Tissues	Inside movable parts	Movements and locomotion.
4.	Nervous Tissues	Central Peripheral and every organ	Communication and control.



Epithelial Tissue

Simple : • Composed of single layer of cells.

• Functions as lining for body cavities, ducts and tubes.

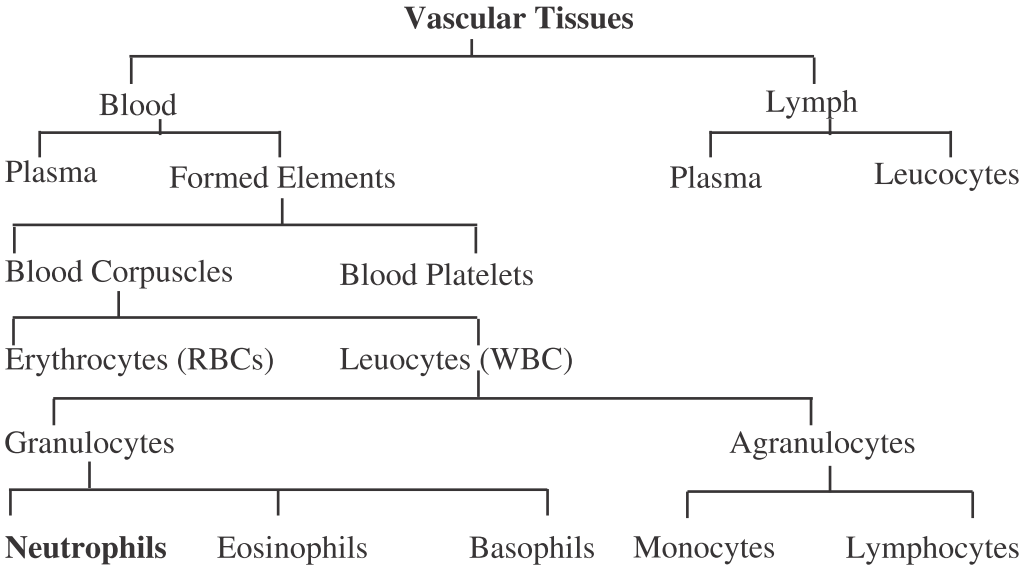
1. Squamous
   - single thin layer of flattened cells.
   - found in walls of blood vessels, air sacs of lungs.
2. Cuboidal
   - single layer of cube like cells.
   - found in ducts of glands and tubular parts of nephron.
3. Columnar
   - single layer of tall and slender cells.
   - free surface may have microvilli.
   - found in living of stomach and intestine.
4. Ciliated
   - columnar or cuboidal cells with cilia.
   - move particles or mucus in specific direction, in bronchioles, fallopian tubes.

Compound

- Made of more than one layer of cells.
- Provide protection against chemical and mechanical stresses.
- Cover dry surface of skin, moist cavity, pharynx, inner lining of ducts of salivary glands and pancreatic ducts.

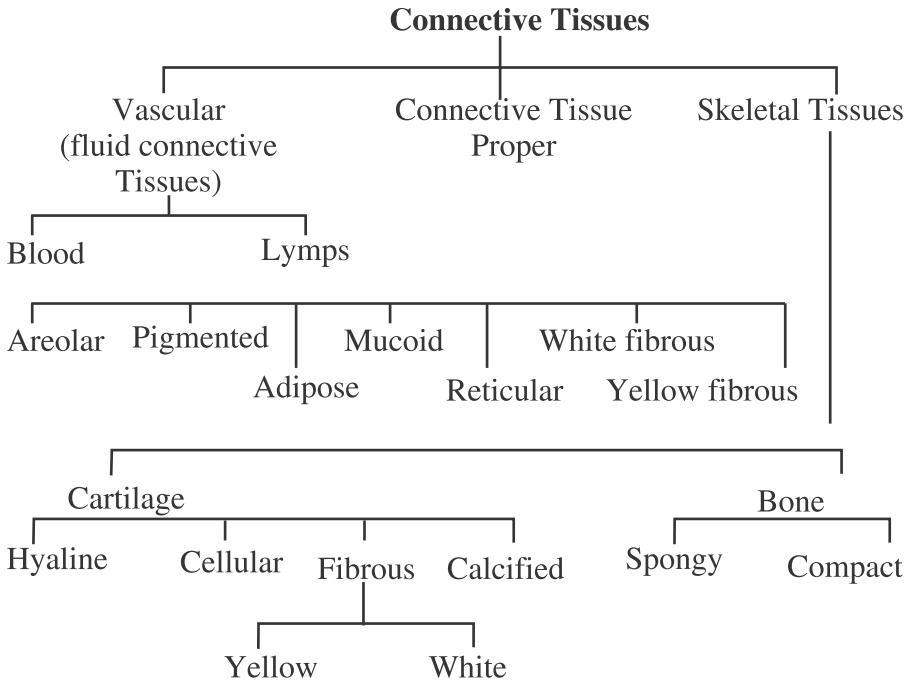
Glandular epithelium

Exocrine glands	**Endocrine glands**
• secrete mucus, saliva, oil, milk, digestive enzymes.	• secrete hormones.
• products released through ducts.	• secrete directly into the fluid bathing the gland.



Connective tissue : Link and support other tissues / organs of the body.

CONNECTIVE TISSUE



Loose Connective Tissue

(has cells and fibres loosely arranged in semi-fluid ground substance)

(i) Areolar Tissue :

- present beneath the skin.
- contains fibroblasts, macrophages and mast cells.
- serves as a support framework for epithelium.

(ii) Adipose Tissue :

- located beneath the skin.
- cells are specialised to store fats.

Dense Connective Tissue

Fibres and fibroblasts are compactly packed.

(i) Dense Regular

- Collagen fibres present in rows.
- Tendons attach skeletal muscle to bone.
- Ligaments attach bone to bone.

(ii) Dense Irregular

- Has collagen fibres and fibroblasts oriented differently.
- This tissue is present in the skin.

Specialised Connective Tissue

(i)	Cartilage	made up of chondrocytes and collegen fibres.
(ii)	Bones	Ground substance is rich in calcium salts and collegen fibres Osteocytes are present in lacunae
(iii)	Blood	Fluid connective tissue, consists of plasma and blood cells

Muscle Tissue

Consists of long, highly contractile cells called fibres; bring about movement and locomotion.

(i) Skeletal Muscle

- Consists of long cylindrical, multinucleated fibres.
- Closely attached to skeletal bones.
- Striated.

(ii) Smooth Muscles

- Consists of spindle like, uninucleated fibres.
- Do not show striations.
- Wall of internal organs such as blood vessels, stomach and intestine.

(iii) Cardiac Muscles

- Short, cylindrical, uninucleated fibres.
- Occur in the heart wall.
- Intercalated discs for communication.

Neural Tissue

- Neurons are the functional unit and are excitable cells.
- Neuroglia cells make up more than half the volume of neural tissue. They protect and support neurons.

Cockroach – *Periplaneta americana*

Cockroach is a terrestrial, nocturnal, omnivorous, unisexual, oviparous insect. Body covered by a chitinous, hard exoskeleton of hard plates called sclerites.

Head : Triangular, formed by fusion of 6 segments. Bears a pair of antennae, compound eyes. Mouth parts consists of labrum (upper lip), a pair of mandibles, a pair of maxillae, labium (lower lip), hypopharynx (acts as tongue).

Thorax : 3 segments; prothorax, mesothorax and metathorax. Bears 2 pairs of wings :

Forewings : tegmina (mesothoracic).

Hindwings : transparent, membranous (metathoracic)
3 pairs of legs in thoracic segments. (one pair in each thoracic segment.)

Abdomen : 10 segments. Bears a pair of long, segmented **anal cerci** in both sexes and a pair of short, unjoined **anal styles** in males only.

Also has anus and genital aperture at the hind end. Genital aperture surrounded by external genitalia called **gonapophysis or phallomere.**

Male Cockroach	Female Cockroach
1. Abdomen long and narrow	1. Abdomen short and broad
2. All nine sterna visible	2. Seven sterna visible. (7th sternum fused with 8th and 9th sterna)
3. Anal style present	3. Anal style absent

Anatomy : Study of the morphology of internal organs.

Alimentary canal : Divided into foregut, midgut and hindgut.

Mouth → Pharynx → Oesophagus → Crop (stores food) → Gizzard (grinding of food) → Hepatic caecae (at junction of fore and midgut; secretes digestive juice) → Hindgut (ileum, colon, rectum) → Anus.

Blood vascular system : Open type, visceral organs bathed in haemolymph (colourless plasma and haemocytes).

Heart consists of enlongated muscular tube and differentiated into funnel-shaped chambers with ostia on either side. Blood from sinuses enters heart through ostia and is pumped anteriorly to sinuses again. Blood is colourless (haemolymph).

Repiratory system : Network of trachea which open through 10 spiracles. Spiracles regulated by sphincters. Oxygen delivered directly to cells.
Excretion and osmoregulation : by malpighian tubules; uricotelic (Uric acid as excretory product).

Nervous system : Consists of series of fused segmentally arranged ganglia joined by paired longitudinally connectives on the ventral side. three ganglia in thorax, six in abdomen. Brain represented by supra-oesophageal ganglion.

Reproductive system :

Male reproductive system : Pair of testes (4th-6th segments) → vas deferens → ejaculatory duct → male gonophore.

Glands – Seminal vesicle (stores sperms), mushroom shaped gland (6th-7th segment).

Female reproductive system :

A pair of ovaries (with 8 ovarian tubules) → Oviduct → Genital chamber.

Sperms transferred through spermatophores. Fertilised eggs encased in capsules called oothecae; development of *P. americana* paurometabolous (incomplete metamorphosis). Nymph grows by moulting 13 times to reach adult form.

Interaction with man

- Pests as destroy food and contaminate it.
- Can transmit a variety of bacterial diseases (Vector).

QUESTIONS

Very Short Answer Questions (1 mark each)

1. Name the tissue which contains Haversian canals.

2. Mention two special properties of nervous tissues.

3. Name the large cells present in adipose tissue.

4. Name the cells responsible for clotting of blood.

5. What are exocrine glands ?

6. Differentiate between tendon and ligament.

7. Where are RBC's formed?

8. A muscular fiber having no striations and tapers at both ends. Name it.

9. Mention the site of sclerite present in cockroach.

10. Name the mouth part of cockroach which is comparable to our tongue.

Short Answer Questions-II (2 marks each)

11. What is the function of ciliated epithelium ? Where do we find this epithelium?

12. What are the two types of fibres of connective tissues ? Distinguish between the two.

13. To which tissue do the following belong to :

(a) Osteocytes (b) Chondrocytes

(c) Neuroglia (d) Intercalated discs

14. Give the location of hepatic caecae in cockroach ? What is their function ?

15. Name the locomotory appendages of cockroach on the basis of external morphology.

Short Answer Questions-I (3 marks each)

16. Differentiate between skeletal and smooth muscles.

17. Differentiate between male and female cockroach on the basis of external morphology.

18. (a) What is open circulatory system ?

(b) Explain the respiratory system of cockroach.

19. (a) Give the common name of *Periplaneta americana.*

(b) How many spermathecae found in cockroach ?

(c) What is the position of ovaries in cockroach ?

(d) How many segments are present in the abdomen of cockroach ?

(e) Where do you find malpighian tubules ?

(f) What is mosaic vision ?

20. Name the different cell junctions found in tissues.

21. Mention the special features of eye in cockroach.

22. Write the appropriate type of tissue in column B accounting to the functions mentioned is column A.

	Column A	Column B
a.	Linking and supporting frame work	.....
b.	Protective covering	.....
c.	Secretion and absorption	.....

Long Answer Questions (5 marks each)

23. (a) What is compound epithelium ? What are their main function ?

(b) Where do we find areolar tissue ?

(c) How is adhering junction different from gap junction ?

24. Make a neat and well labelled diagram showing alimentary canal of cockroach

ANSWERS

Very Short Answers (1 mark each)

1. Mammalian bone.

2. Excitability and conductivity.

3. Adipocytes.

4. Blood platelets.

5. Glands which discharge their secretions into ducts.

6.

Tendon	**Ligament**
Attach skeletal muscles to bones	Attach bone to bone

7. Bone narrow

8. Smooth or non striated muscle fibre.

9. In the exoskeleton all over the body.

10. Hypo pharynx = lingua

Short Answer-II (2 marks each)

11. Refer 'Points to Remember'.

12. White and yellow fibres. White fibres are thin, wavy, unbranched, inelastic, occur in bundles and formed of protein collagen. Yellow fibres are thick, straight, elastic, branched, occuring singly, formed of protein elastin.

13. (a) Bone tissue (b) Cartilage

(c) Neural tissue (d) Cardiac muscle

14. Refer 'Points to Remember'.

15. Three pairs of legs and 2 pairs of wings.

Short Answers-I (3 marks each)

16. Refer 'Points to Remember'.

17. Refer 'Points to Remember'.

18. Refer 'Points to Remember'.

19. (a) American Cockroach.

(b) One pair, present in 6th segment.

(c) Between 2nd and 6th abdominal terga.

(d) 10 segments.

(e) At the beginning of ileum in cockroach.

(f) Vision where several images of an object are formed by compound eye. Helps to detect movement of objects very efficiently.

20. (i) Gap junctions (ii) Tight junctions

(iii) Adhering junctions

(a) Desmosomes. (b) Hemidermosomes

(c) Terminal bars

21. See text in NCERT at page No. 114

(i) Situated at dorsal surface of head.

(ii) Each eye consists of about 2000 hexagon ommatidia.

(iii) It can receive several images of an object.

(iv) This kind of vision is known as masaic vision.

(v) It is more sensitivity but less resolution.

22. (a) Connective tissue

(b) Stratified epithelium

(c) Columnar epithelium

Long Answers (5 marks each)

23. Refer 'Points to Remember'.

24. Refer Fig 7.16 NCERT Text Book of Biology class-XI