

7.STRUCTURAL ORGANISATION IN ANIMALS

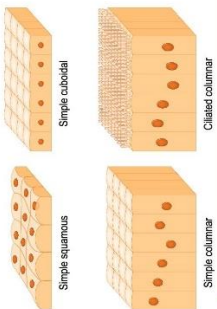


Biology Smart Booklet

Theory + NCERT MCQs + NEET PYQs

STRUCTURAL ORGANIZATION IN ANIMALS

EPITHELIAL CELLS



Tight- check the flow between cells.
Gap- helps in between cells' communication.
Adhering- cements the cells together.

RANA TIGRINA

Cold-blooded



Male Reproductive System
- Testes: pair of yellowish, oval structures, adjoins to upper part of kidneys by mesorchium.

Female Reproductive System
- A pair of ovaries situated near kidneys.
- No functional connection with kidneys by mesorchium.

Fertilization
- External in water.
- Development takes place in larval stage, tadpole, adult.

Circulatory System
- Heart: 3-chambered.
- 2 Atria + 1 Ventricle.
- Venae cavae opens into conus arteriosus on ventral side of heart.
- Blood from heart is carried to all body parts by arterial system.

Blood Vascular System
- Heart + Blood vessels + Blood.
- RBCs are nucleated and red in color.

Lymphatic System
- Lymph + Lymph gland + Lymph nodes.
- Lymph has no RBCs.

Digestive System
- Short alimentary canal + digestive glands.
- Mouth → Buccal cavity → Stomach → Intestine → Rectum → Cloaca.
- Digested food is absorbed with intestine and undigested solid waste is removed via cloaca.

Respiratory System
- Lungs - Buccal cavity skin and lungs as pulmonary respiratory organs.
- Water - skin acts as cutaneous respiratory organ.

Animal tissue

- Epithelial Tissue**
 - Cuboidal**: Columnar and cuboidal are specialized and for secretion.
- Glandular**: Columnar and cuboidal are specialized and for secretion.

- Connective Tissue**
 - Loose**
 - Areolar
 - Adipose
 - Dense**
 - Regular
 - Irregular

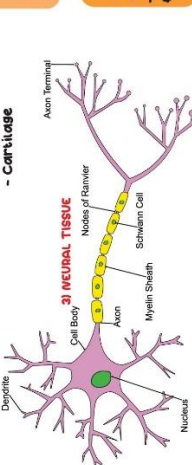
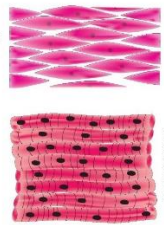
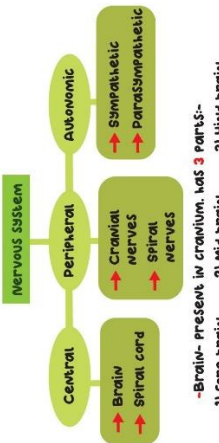


Diagram of Neuron

4) MUSCULAR TISSUE
- Skeletal/ striated - long & cylindrical present in limbs, tongue & pharynx
- Smooth/ unstriated - walls of viscera
- Spindle shaped with pointed end
- Cardiac - long & cylindrical
- Present in heart



Skeletal Muscle Tissue, Smooth Muscle Tissue



-Brain- present in cranium, has 3 parts:-
1) Fore brain 2) Mid brain 3) Hind brain

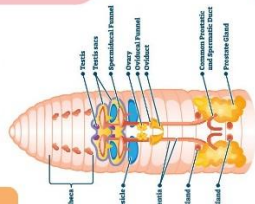
Common Indian varieties PEREGRINA AND LUMBRICUS



Reproductive System (Hermaphrodite)
- Male - 2 pairs of testes 10th and 11th.
- Vas deferentia upto 18th segment.
- One pair of accessory glands in 17th and 19th segments.
- 4 pairs of spermathecae in 6th - 9th segments.

Female - 1 pair of ovaries at 12th intersegmental septa or 13th.
- Oviducts opens on 14th segment as female genital pore.

REPRODUCTIVE SYSTEM OF EARTHWORM



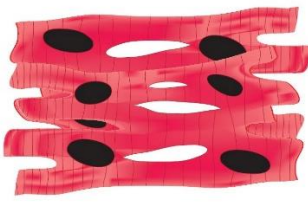
Equimous
- Protection against abrasion.
- Epidermis of skin, hair & oral cavity.

Columnar
- Protection & secretion.
- Epiglottis & mammary glands.

Cuboidal
- Help in mechanical & chemical stress.
- Sweat glands, anal canal & female urethra.

Columnar - Stratified
- Protection & movement of mucus & egg.
- Respiratory tract & fallopian tube.

LOREM IPSUM



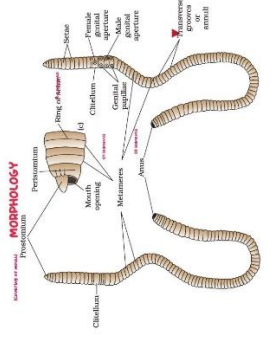
Cardiac muscle tissue

EXCRETORY SYSTEM
- Excretory organ - Metanephridia
- Metanephridia - attached to the living or body wall from 3rd to end.
- Septa - Pressure on both sides of intersegmental septa of 15th to end.
- Pharynx - 2 pairs of paired tufts in 1st - 6th segments.
- Metanephridia regulate volume and composition of body fluids.

They start at a funnel to connect excess fluid from coelomic chamber.
- Deiner body waste to body to body wall surface through pore.

Sensory System
- No eyes but sensitive to light & touch.
- Chemoreceptors 7 for response to chemical stimuli.
- Sense organs located on anterior part of body

Digestive System
- 1-3 segments → Terminal mouth opens in buccal cavity.
- Muscular Pharynx → 5-7 segments.
- Oesophagus → 8-9 segments.
- Gizzard → helps in grinding soil and decaying leaves.
- Stomach → 9-11 segments - calciferous gland neutralizes lactic acid in humus
- Intestine → 15- last segment - Open into typhlosole → Characterised by presence of internal medial fold of dorsal wall.



MORPHOLOGY

Male Reproductive System
- Pair of testes at 10th-6th abdominal segment.
- Genital pouch, has 21 pairs of spermathecae
- Anal style present.

Female Reproductive System
- Pair of ovaries at 2nd-6th abdominal segment.
- Genital pouch, has 12 pairs of spermathecae
- 31 lateral bands

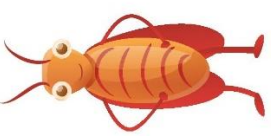
Respiratory System
- Trachea, divided into tracheoles
- Tracheoles carry oxygen to all body parts.
- Trachea opens via spiracles.

Vascular System
- Blood called Haemolymph has colourless plasma and haemocytes.
- Atrial muscles help in circulation.
- Heart is dorsal and 13 chambered.

Open type
- Blood called Haemolymph has colourless plasma and haemocytes.
- Atrial muscles help in circulation.
- Heart is dorsal and 13 chambered.

Alimentary Canal
- Divided into - Foregut, midgut and hindgut.
- Mouth opens into → Pharynx → Oesophagus → Crop (food storing region) → Gizzard, where grinding of food occurs → Hepatic Caeca → Midgut → Malpighian tubules → Hindgut.
- Hindgut is divided into ileum, Colon and Rectum.
- Rectum opens out through anus.

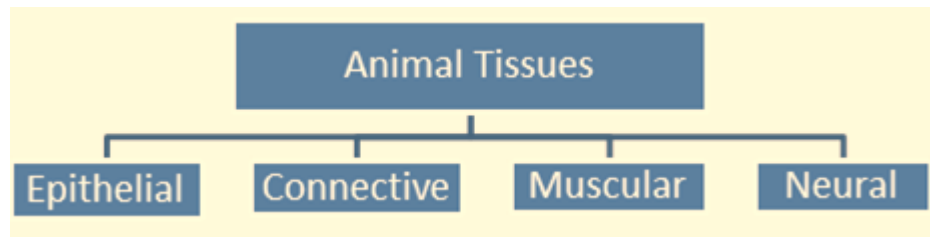
General Features
- Body - Head - Prothorax - Mesothorax - Abdomen - Metathorax
- Head has compound eye. Ocellus and antennae.
- Has mosaic vision for nocturnal vision



STRUCTURAL ORGANISATION IN ANIMALS

Tissue

In multicellular organism a group of similar cells along with intercellular substances perform a specific function. Such organization is called tissue.



Epithelial Tissue

This tissue provides covering or lining for some part of the body. Cells are compactly packed without intercellular space.

Simple Epithelial: Composed of single layer of cells & Functions as lining for body cavities, ducts and tubes.

Squamous Epithelium: Single thin layer of flattened cells found in walls of blood vessels, air sacs of lungs.

Cuboidal Epithelium: Single layer of cube like cells found in ducts of glands and tubular parts of nephron.

Columnar Epithelium: Single layer of tall and slender cells & free surface may have microvilli & found in lining of stomach and intestine.

Ciliated Epithelium: Columnar or cuboidal cells with cilia move particles or mucus in specific direction, in bronchioles, fallopian tubes.

Cell junctions

In nearly all animal tissues, specialized junction provide structural and functional links between its individual cells.

Three Types of Cell junctions:

- i. **Tight junctions:** Plasma membranes of adjacent cells are fused at intervals. They help to stop substances from leaking across a tissue.
- ii. **Adhering junctions:** Perform cementing function to keep neighbouring cells together.
- iii. **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.

Compound Epithelium

- 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

Exocrine glands

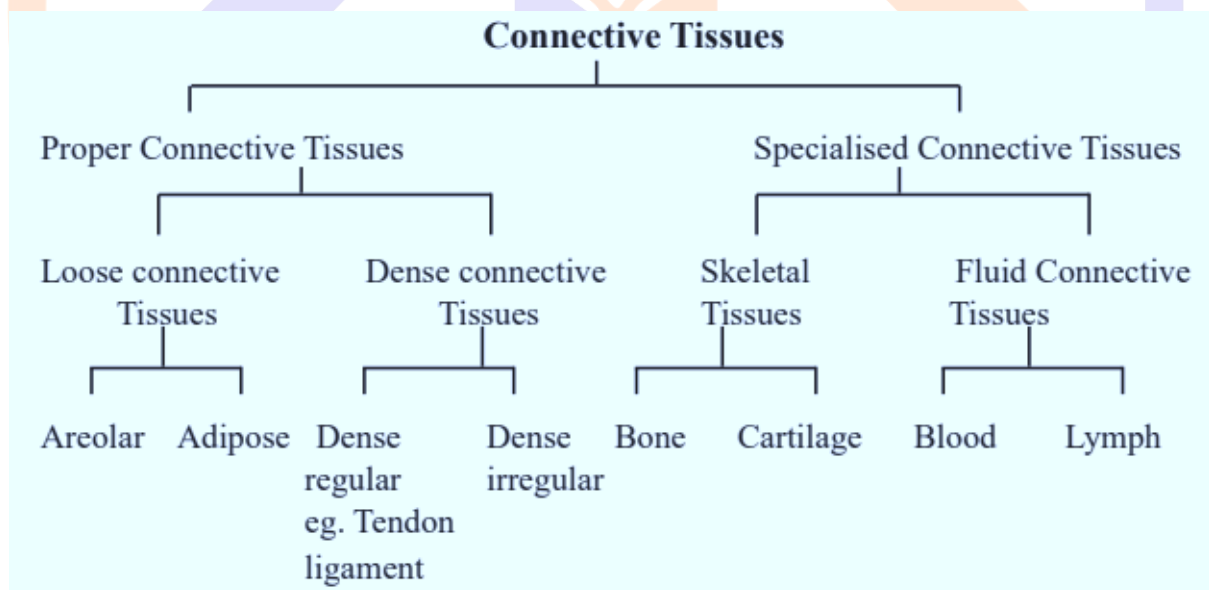
- Secrete mucus, saliva, oil, milk digestive enzymes.
- Products released through ducts.

Endocrine glands

- Secrete hormones.
- Secrete directly into the fluid bathing the gland.

Connective tissue

They are most abundant and widely distributed tissues which link and support the other tissues. All connective tissues except blood cells, secrete fibers of structural protein called collagen or elastin to provide elasticity and flexibility.



Loose Connective Tissue: contain cells and fibers loosely arranged in semi-fluid ground substance. It includes areolar tissue and adipose tissue.

Areolar Tissue

- Present beneath the skin.
- Contains fibroblasts, macrophages and mast cells.
- Serves as a support framework for epithelium.

Adipose Tissue

- Located beneath the skin.
- Cells are specialized to store fats.

Dense connective Tissue: Dense connective Tissue contains fibers and fibroblast compactly packed. The orientation of fibers may be regular or irregular pattern In dense regular connective tissues collagen fibers are present in rows between parallel bundles of fibers as in tendons and ligaments.

Tendon

- Tendon connects bones to skeletal muscles.
- It is made up of white fibrous tough tissue.

Ligament

- Ligament connects one bone to another bone.
- It is made up of yellow elastic tissue with collagen fibers.

Cartilage

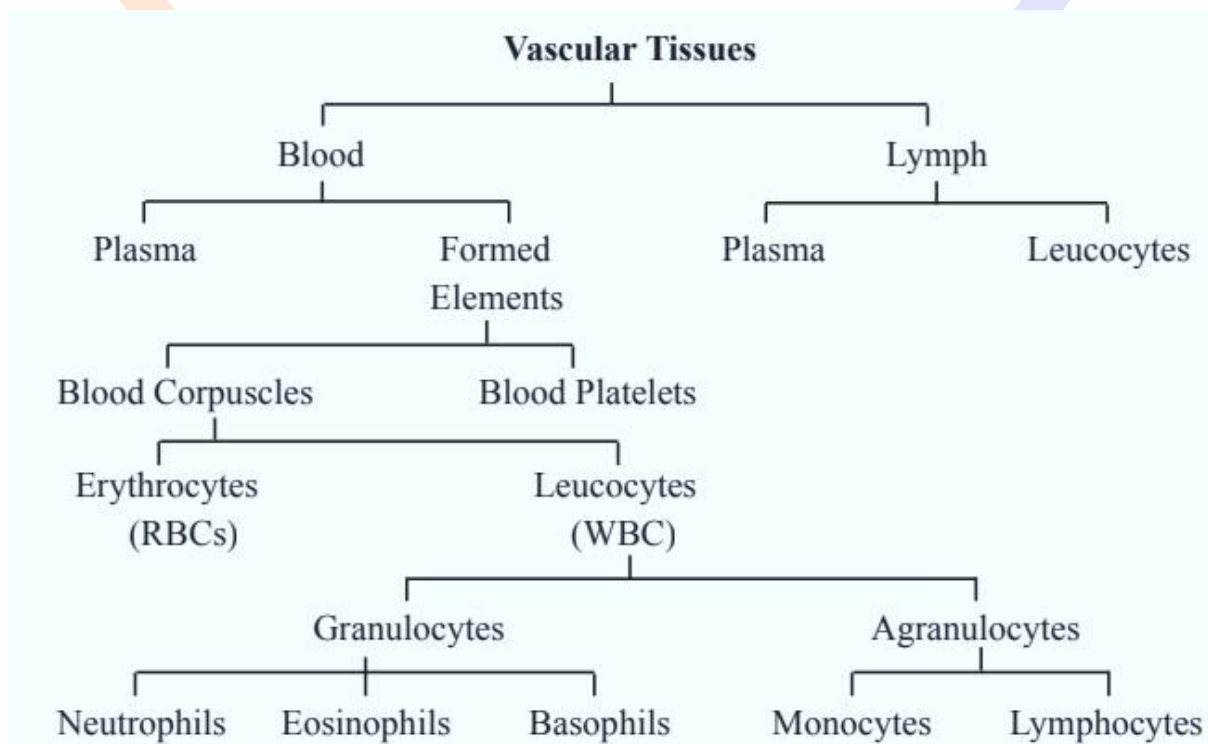
- They are soft skeletal tissue.
- chondrocyte are enclosed in small cavities with matrix.
- They are present in tips of nose, outer ear, between vertebral bones.

Bone

- Bones are hard skeletal tissue.
- They are rich in Calcium salt and collagen fibers.
- They form the skeletal framework of vertebrates like limbs, legs, etc.

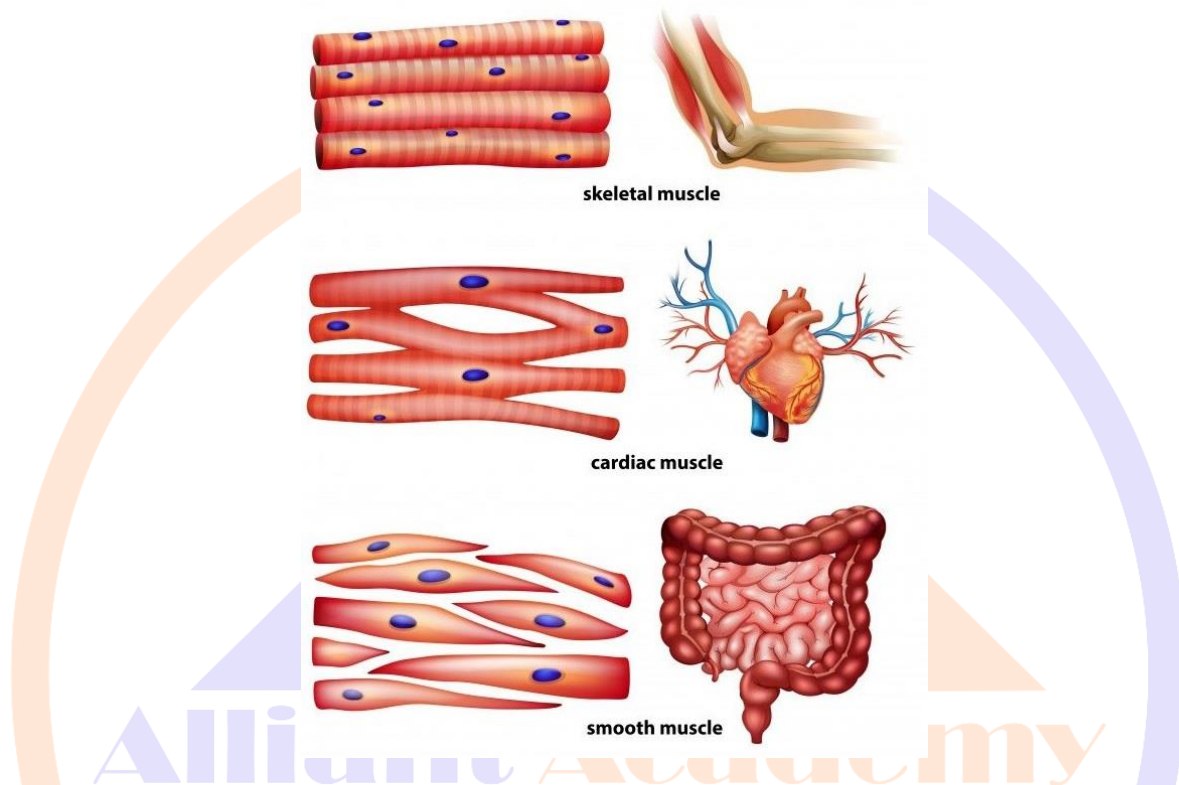
Blood

Blood is fluid connective tissue containing plasma, red blood cells, white blood cells and platelets. It helps in transportation of various substances between organs.



Muscle Tissue

Each muscle is made up of long cylindrical fibers arranged parallel to each other. Fibers are composed of fine fibrils called myofibrils. Muscle fibers contract and relax in response to stimulation.



Skeletal Muscle

- They are also known as striated, voluntary muscles.
- Multinucleated with light and dark bands.
- They are attached with bones.
- They are fibrous and un-branched, cylindrical in shape.

Smooth Muscle

- They are known as unstriated or involuntary muscles.
- They are uninucleate without bands.
- They are present in vessels, oesophagus.
- They are fibrous and un-branched, spindle shaped.

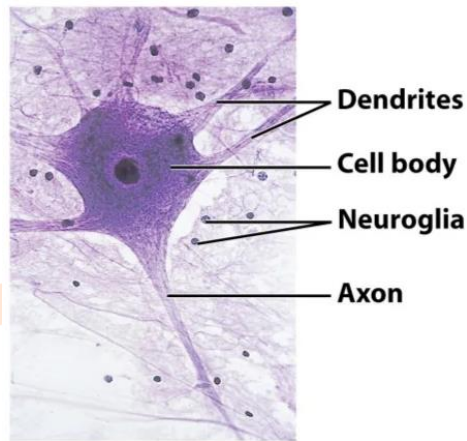
Cardiac Muscle

- They are known as heart muscles and involuntary in nature.
- Uninucleate with faint light and dark bands.
- They are present in wall of heart.
- They are fibrous and branched, cylindrical in shape.

Neural Tissue

- The unit of neural system is neuron. Neuroglial cell protects and supports the neuron.
- When neuron get stimulated, electrical impulses are generated that

travel along the plasma membrane (axon).



Cockroach

Periplaneta americana (Phylum-Arthropoda, Class-Insecta)

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

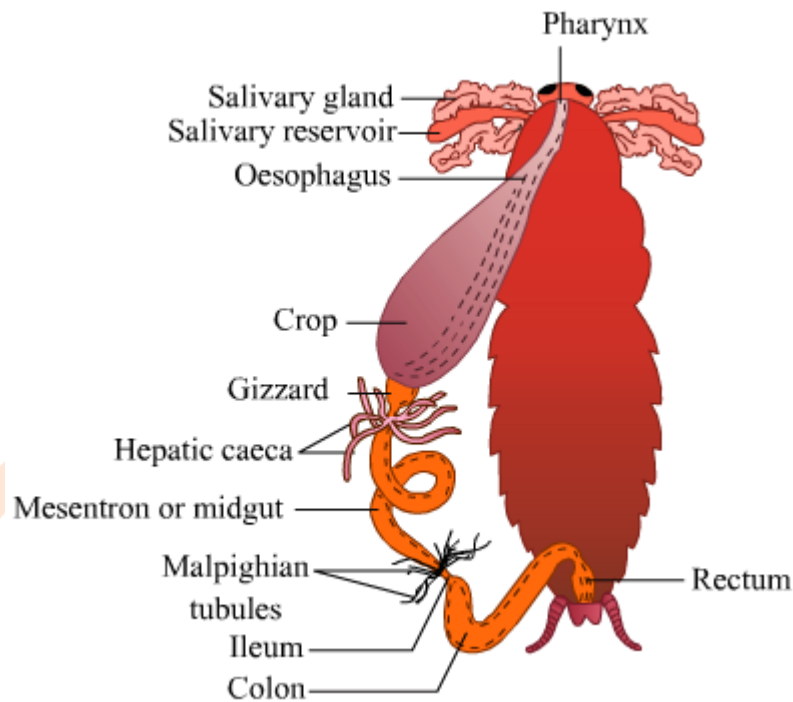
Morphology

- **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), hypharynx (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 7th segment is boat shaped. Also has anus and genital aperture at the hind end. Genital aperture surrounded by external genitalia called gonapophysis or phallomere.

Male Cockroach: Abdomen long and narrow, All nine sterna visible & Anal style present.

Female Cockroach: Abdomen short and broad, Seven sterna visible. (7th sternum fused with 8th and 9th sterna) & Anal style absent.

Alimentary canal: Divided into foregut, midgut and hindgut. Mouth → Pharynx → Oesophagus → Crop (stores food) → Gizzard (grinding of food) → Hepaticcaecae (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 elongated 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 colorless (haemolymph).

Respiratory system: Network of trachea which open through 10 pairs of 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 supraoesophageal ganglion. Each eye consists of 200 hexagonal ommatidia.

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 female produces 9-10 Ootheca. Fertilized eggs encased in capsules called oothecae (contains 14-16 eggs on an average) development of *P. americana* paurometabolous incompleting 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).

NCERT LINE BY LINE QUESTIONS

PARA – 7.1.1 EPITHELIAL TISSUES

1. Consider the following statements: [Pg-100,101,E]
 - a) A tissue is composed of similar cells which perform specific functions.
 - b) Epithelial tissues are characterized by a free surface toward body fluid or outside environment.

Select the correct option.

A) a is true, b is false	B) Both a and b are true
C) a is false, b is true	D) Both a and b are false

2. Simple epithelium consists of [Pg-101,E]
 - A) large intercellular spaces
 - B) single layer of cells
 - C) flat cells without nucleus
 - D) all of these

3. Human skin is composed of [Pg-101,E]
 - A) compound epithelium
 - B) squamous epithelium
 - C) columnar epithelium
 - D) ciliated epithelium

4. Match the following columns. [Pg-101,M]

Column-I a Squamous epithelium b Cuboidal epithelium c Columnar epithelium	Column-II (1) Stomach and intestine (2) Lungs and blood vessels (3) Tubular parts of nephrons
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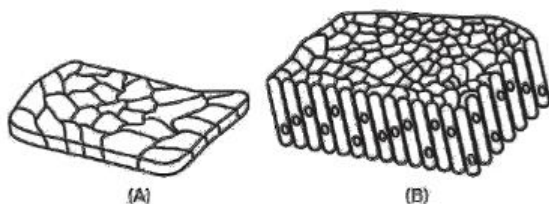
Select the correct option

A	b	c
A) 3	1	2
B) 1	2	3
C) 2	3	1
D) 3	2	1

5. The inner walls of large blood vessels are formed by [Pg-101,E]
 - A) pseudostratified epithelium
 - B) squamous epithelium
 - C) ciliated epithelium
 - D) columnar epithelium

6. What is the similarity between cuboidal epithelium and columnar epithelium?
 - A) They are composed of two layers of cells.
 - B) They are composed of phagocytic cells.
 - C) They perform the functions of secretion and absorption.
 - D) All of these

7. Identify the tissues A and B shown in the following diagram: [Pg-101,E]



Select the correct option

A
A) Squamous epithelium

B
B) Columnar epithelium

- | | |
|------------------------|---------------------|
| B) Cuboidal epithelium | Squamous epithelium |
| C) Columnar epithelium | Cuboidal epithelium |
| D) Compound epithelium | Pseudostratified |

8. Efficient gaseous exchange in the air sacs of the lungs occur due to the presence of [Pg-101,E]
 A) numerous microvilli
 B) ciliated epithelium
 C) flat cells
 D) columnar epithelium
9. The inner surface of hollow organs are lined by [Pg-101,E]
 A) columnar epithelium
 B) compound epithelium
 C) squamous epithelium
 D) ciliated epithelium
10. The ciliated epithelial cells are required to move particles or mucus in a specific direction. In humans, these cells are mainly present in [Pg-101,E]
 A) fallopian tubes and pancreatic duct
 B) Eustachian tube and salivary duct
 C) bronchioles and fallopian tubes
 D) bile duct and bronchioles
11. Match the following columns.
- | | |
|--------------------|--|
| Column-I | Column-II |
| a. Goblet cells | (1) Multicellular glandular epithelium |
| b. Salivary glands | (2) Unicellular glandular epithelium |
| c. Buccal cavity | (3) Compound epithelium |
| d. PCT | (4) Cuboidal epithelium |
- Select the most appropriate option.
- | | | | |
|----------|----------|----------|----------|
| a | b | c | d |
| A) 2 | 1 | 3 | 4 |
| B) 3 | 2 | 4 | 1 |
| C) 4 | 3 | 1 | 2 |
| D) 1 | 4 | 2 | 3 |
12. All the listed glands pour their secretions into ducts except [Pg-102,E]
 A) salivary gland
 B) digestive glands
 C) pineal gland
 D) mammary glands
13. Select the incorrect statement. [Pg-102,E]
 A) Multicellular glandular epithelium is formed of clusters of cells.
 B) Compound epithelium is actively involved in secretion and absorption of substances.
 C) Pancreatic and salivary ducts are internally lined by compound of epithelium.
 D) None of these
14. Cell junctions [Pg-102,M]
 a) Are formed in epithelial tissues
 b) Provide structural and functional link between adjacent cells of tissues
 c) Are alternatively called gap junctions
 Select the most appropriate option.
 A) a, b, c are correct
 B) Only a is correct
 C) b and c are correct
 D) a and b are correct
15. Match the following cell structure with its characteristic feature: [Pg-102,M]
- | | |
|-----------------------|---|
| Column-I | Column-II |
| a. Tight junctions | (1) Cement neighbouring cells together to form sheet |
| b. Adhering junctions | (2) Transmit information through chemical to another cells |
| c. Gap junctions | (3) Establish a barrier to prevent leakage of fluid across epithelial cells |
| d. Synaptic junctions | (4) Cytoplasmic channels to facilitate communications between adjacent |

cells

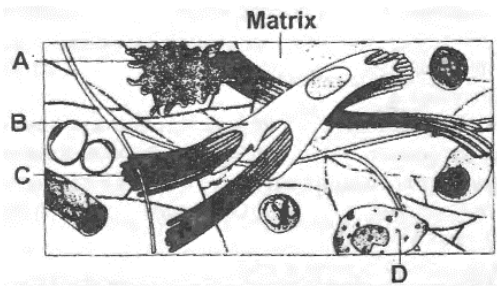
Select the most appropriate option.

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

16. The function of the gap junction is to **[Pg-102,E]**
 A) stop substance from leaking across a tissue.
 B) perform cementing to keep neighbouring cells together.
 C) facilitate communication between adjoining cells by connecting the cytoplasm for rapid transfer of ions, small molecules and some large molecules.
 D) separate two cells from each other.
17. Assertion: Squamous epithelium helps in the diffusion of gases in lungs.
 Reason: Squamous epithelium bears microvilli. **[Pg-101,H]**
 A) Both assertion and reason are true, assertion is incorrect explanation of assertion
 B) Both assertion and reason are true, reason is not the correct explanation of assertion
 C) Assertion is true, reason is false
 D) Both assertion and reason are false
18. Assertion: Compound epithelium is composed of two or more layers of cells.
 Reason: Compound epithelium has protective functions. **[Pg-102,H]**
 A) Both assertion and reason are true, assertion is incorrect explanation of assertion
 B) Both assertion and reason are true, reason is not the correct explanation of assertion
 C) Assertion is true, reason is false
 D) Both assertion and reason are false

PARA-7.1.2 CONNECTIVE TISSUES

19. Select the incorrect statement regarding connective tissues: **[Pg-102,103,E]**
 A) It helps to connect and support other tissues of the body.
 B) Blood is a fluid connective tissue.
 C) It is composed of structural protein fibres, viz, collagen or elastin.
 D) Their ground substance is composed of polypeptides and its derivatives.
20. Areolar tissue is a type of **[Pg-103,E]**
 A) loose connective tissue
 B) compound epithelium
 C) dense connective tissue
 D) specialized connective tissue
21. Areolar tissues contain **[Pg-103,E]**
 A) T lymphocytes tissue and B lymphocytes
 B) fibroblast, macrophages, mast cells
 C) fibroblast cells only
 D) fibroblasts and fat globules
22. Fat-storing adipose tissue is **[Pg-103,E]**
 A) loose connective tissue
 B) dense regular connective tissue
 C) dense irregular connective tissue
 D) specialized connective tissue
23. Consider the following statements: **[Pg-103,M]**
 a) In dense connective tissues, fibroblasts are compactly packed.
 b) In dense regular connective tissues, collagen fibers are arranged in parallel rows.
 Select the correct option
 A) a is true, b is false
 B) a is false, b is true
 C) Both a and b are false
 D) Both a and b are true
24. In the below diagram of areolar connective tissue, the different cells and parts have been indicated by alphabets.
 Choose the answer in which these alphabets correctly match with the parts and cells they indicate – **[Pg-103,E]**



A	B	C	D
A) Adipocyte	Collagen fibres	Microfilament	Mast cells
B) Macrophage	Collagen fibres	Microfilament	Mast cells
C) Macrophage	Collagen fibres	Microtubule	RBC
D) Macrophage	Fibroblast	Collagen fibres	Mast cells

25. Ligaments contain [Pg-103,E]

- A) loose bundles of fibres
- B) large fat storage areas
- C) parallelly arranged collagen fibres
- D) irregularly placed elastin fibres

26. Match the following columns: [Pg-103,104,E]

Column-I

- a Skin
- b Tendon
- c Adipose tissue
- d Cartilage

Column-II

- (1) Loose connective tissue
- (2) Specialized connective tissue
- (3) Dense regular connective Tissue
- (4) Dense irregular connective tissue

Select the correct option

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

27. The intracellular material of cartilage is [Pg-104,E]

- A) solid and pliable
- B) solid and non-pliable
- C) hollow and soft
- D) hollow and jelly-like

28. Select the incorrect statement: [Pg-104,E]

- A) Most of cartilage in vertebrate embryo gets replaced by bones in adults.
- B) Chondrocytes are cartilage cells which are found in between collagen fibres.
- C) Cartilage form the human nose except its tips.
- D) Bones of vertebral column are composed of cartilage.

29. Bones are hard and non-pliable due to the presence of [Pg-104,E]

- A) calcium salts
- B) elastin fibres
- C) chondrocytes
- D) all of these

30. The spaces in which osteocytes are present are called [Pg-104,E]

- A) osteoclast
- B) sinuses
- C) lacunae
- D) canaliculi

31. The fluid connective tissue contains all of the following cells, except [Pg-104,E]

- A) platelets
- B) fibroblasts
- C) WBCs
- D) RBCs

32. Match the following columns: [Pg-103,104,E]

Column-I

- a Adipose tissue
- b Hyaline cartilage
- c Fluid connective tissue
- d Areolar tissue

Column-II

- (1) Blood
- (2) Macrophages and mast cells
- (3) Fat storage
- (4) Nose

Select the correct option

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

PARA-7.1.3 AND 7.1.4**MUSCLE TISSUE AND NEURAL TISSUE**

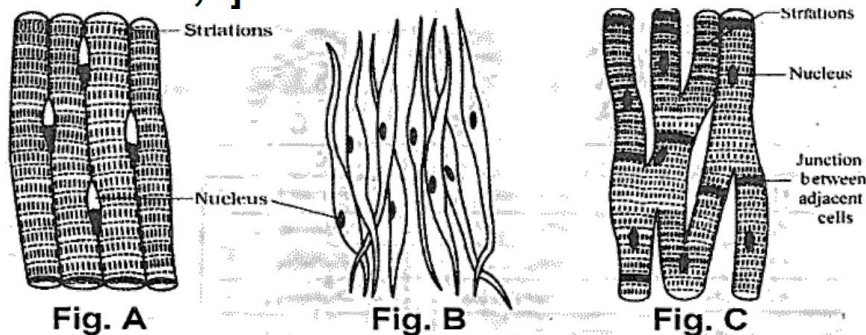
33. Myofibrils are [Pg-104,E]

- A) contracted muscle fibres B) structural components of all muscle fibres
C) striated muscle fibres D) skeletal muscle fibres

34. Skeletal muscles are [Pg-104,E]

- A) striated in appearance
B) smooth in appearance
C) involuntary muscles
D) both A and C

35. Go through the following figures. [Pg- 105,E]



Identify these muscles (A, B and C).

A**B****C**

- A) Smooth muscles Striated muscles Cardiac muscles
B) Cardiac muscles Smooth muscles Striated muscles
C) Striated muscles Smooth muscles Cardiac muscles
D) Involuntary muscles Voluntary muscle Heart muscle

36. Involuntary muscle fibers in human body are found in [Pg-105,E]

- A) heart B) blood vessels C) intestine D) all of these

37. Consider the following statements: [Pg-105,M]

- a) All involuntary muscles are smooth in appearance.
b) All striated muscles are voluntary muscles.

Select the correct option

- A) a) is true, b) is false
B) Both a) and b) are true
C) a) is False, b) is true
D) Both a) and b) are false

38. Which type of tissue correctly matches with its locations? [Pg-103,104,105,E]

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

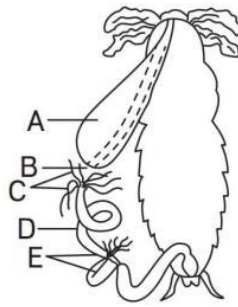
39. The muscular layer lining the stomach and intestine is [Pg-105,E]

- A) striated in appearance
B) smooth in appearance
C) multinucleated
D) characterized by intercalated discs

40. Heart cells have the ability to contract as a unit to the presence of [Pg-105,E]

- A) multinucleate condition B) fusiform shape

- A) tergites and sternites, respectively
 B) sternites and pleurites, respectively
 C) pleurites and tergites, respectively
 D) pleurites and sternites, respectively
51. The triangular head of cockroach [Pg-112,E]
 (1) bear compound eyes
 (2) is formed by the fusion of two segments
 (3) bear chewing and lapping mouthparts
 Select the correct option
 A) 1, 2, 3 are correct
 B) Only 1 is correct
 C) 2 and 3 are correct
 D) 1 and 2 are correct
52. The mouth parts of cockroach contain [Pg-112,E]
 A) two mandibles, two maxillae, labrum, labium and hypopharynx
 B) two mandibles and maxillae each, two labrum and labium each
 C) one mandible and maxilla each, labrum and hypopharynx
 D) one mandible, labrum, labium and hypopharynx
53. Select the incorrect statement regarding cockroach: [Pg-112,E]
 A) Hypopharynx acts as a tongue.
 B) Head is mobile in all directions due to flexible neck.
 C) Antennae possess sensory receptors to monitor the environment.
 D) Thorax is greatly reduced and non divisible.
54. Paired walking legs in cockroaches are found on [Pg-112,E]
 A) each thoracic segments
 B) mesothorax and metathorax
 C) prothorax and metathorax
 D) metathorax only
55. Forewings and hindwings in cockroaches arises from [Pg-112,E]
 A) mesothorax and metathorax
 B) prothorax
 C) metathorax
 D) prothorax and metathorax
56. Match the following columns. [Pg-112,E]
Column-I
 a Scleride
 b Tegmina
 c Ocellus
Column-II
 (1) Forewings
 (2) Simple eye
 (3) Exoskeleton plate
 Select the **correct** option
- | | | | | | | | |
|----|----------|----------|----------|----|----------|----------|----------|
| | a | b | c | | a | b | c |
| A) | 3 | 2 | 1 | B) | 2 | 1 | 3 |
| C) | 3 | 1 | 2 | D) | 2 | 3 | 1 |
57. How the forewings of cockroaches are distinguished from the hindwings? [Pg-112,E]
 A) Forewings are leathery while hindwings are membranous.
 B) Forewings are much longer while hindwings are vestigial.
 C) Forewings are much reduced and hindwings are highly evolved.
 D) Forewings are transparent while hindwings are opaque.
58. In female cockroach [Pg-112,E]
 A) forewings help in flight
 B) abdomen consists of 8 segments
 C) seventh sternum is boat shaped
 D) all of these
59. Which of the following sterna form the brood pouch in female cockroach? [Pg-112,E]
 A) 8th, 9th
 B) 7th, 8th, 9th
 C) 6th, 7th, 8th
 D) 8th, 9th, 10th
60. Which of the following features is used to identify a male cockroach from a female cockroach? [Pg-112,E]
 A) Presence of a boat shaped sternum on the 9th abdominal segment

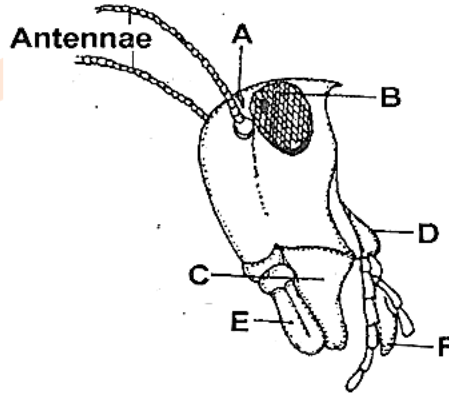


Which of the following options represent correct name and characteristic of labelled structures?

- A) A – Gizzard – Food grinding structure
 B) C – Hepatic caeca – Secretory digestive Juices
 C) D – Ileum – Food absorption
 D) E – Malpighian tubules – 6–8 blind tubules
68. Select the correct sequence of organs in the alimentary canal of cockroach starting from mouth. [Pg- 113,E]
 A) Pharynx → Oesophagus → Gizzard → Crop → Ileum → Rectum
 B) Pharynx → Oesophagus → Gizzard → Ileum → Crop → Colon → Rectum
 C) Pharynx → Oesophagus → Ileum → Crop → Gizzard → Colon → Rectum
 D) Pharynx → Oesophagus → Crop → Gizzard → Ileum → Colon → Rectum
69. During anatomical studies of cockroach, how would you differentiate malpighian tubules (A) from gastric caeca (B)? [Pg- 113,E]
 A) A – 6–8 in number, B – 200–300 in number
 B) A – Present at the junction of midgut and hindgut B – Present at the junction of foregut and midgut
 C) A – Blind, black-coloured tubules B – Hollow, yellow-coloured tubules
 D) All of these
70. Select the incorrect statement regarding cockroach: [Pg-113,E]
 A) Cockroaches possess open circulating system.
 B) Blood vessels are highly developed and open into heart.
 C) Visceral organs found in hemocoel are bathed in hemolymph.
 D) Alary muscles associated with heart are contractile muscles.
71. The heart of cockroach possess [Pg- 113,E]
 A) 10 chambers
 B) 8 chambers
 C) 13 chambers
 D) 12 chambers
72. Match the following columns. [Pg-113,M]
- | | Column-I
(Structures in
cockroach) | | Column-II
(Number) |
|---|--|-----|-----------------------|
| a | Spiracles | (1) | 6–8 |
| b | Heart chambers | (2) | 100–150 |
| c | Hepatic caeca | (3) | 13 |
| d | Malpighian tubule | (4) | 10 |
- Select the correct option
- | | a | b | c | d |
|----|---|---|---|---|
| A) | 2 | 4 | 3 | 1 |
| B) | 3 | 2 | 4 | 1 |
| C) | 1 | 4 | 2 | 3 |
| D) | 4 | 3 | 1 | 2 |
73. Select the incorrect statement regarding cockroach [Pg-113,114,E]
 A) Exchange of gases occurs by diffusion at the tracheoles.
 B) Malpighian tubules remain lined by glandular and ciliated cells.
 C) Uricose glands are principal reproductive glands in female cockroach

- D) Fat bodies and nephrocytes help in excretion of nitrogenous waste
74. The principal nitrogenous waste in cockroach is [Pg-114,E]
A) ammonia B) vasa C) guanine D) uric acid
75. The body cells in cockroach discharge their nitrogenous waste in the hemolymph mainly in the form of [Pg-114,E]
A) calcium carbonate B) ammonia C) potassium urate D) urea
76. How many ganglia are found in the thorax and abdomen of male cockroach? [Pg-114,E]
A) 3 and 6 B) 6 and 4 C) 5 and 5 D) 6 and 3
77. Consider the following statements: [Pg-114,M]
a) Cockroaches remain alive for several hours even after its head is cut off.
b) Nervous system of cockroach is dorsally placed along the whole body.
Select the correct option
A) a is true, b is false B) Both a and b are true
C) a is false, b is true D) Both a and b are false
78. Which of the following statements is incorrect? [Pg-114,M]
A) Female cockroach possesses sixteen ovarioles in the ovaries.
B) Cockroaches exhibit mosaic vision with less sensitivity and more resolution.
C) A mushroom-shaped gland is present in the 6th-7th abdominal of male cockroach.
D) A pair of spermatheca is present in the 6th segment of female cockroach.
79. Match the following columns [Pg-114,E]
Column-I **Column-II**
a Testes (1) 2nd –6th segment
b Ovaries (2) 4th –6th segment
c Spermatheca (3) 6th segment
d Mushroom glands (4) 6th–7th segment
Select the correct option
- | | a | b | c | d |
|------|----------|----------|----------|----------|
| A) 3 | 2 | 4 | 1 | |
| B) 2 | 1 | 3 | 4 | |
| C) 4 | 3 | 1 | 2 | |
| D) 1 | 4 | 2 | 3 | |
80. The bundles of sperms are called [Pg-114,E]
A) phallomere B) gonapophysis C) spermathecal D) spermatophores
81. Phallomere in cockroaches [Pg-114,E]
A) helps to store spermatophores
B) is chitinous external genitalia
C) is accessory reproductive gland
D) represents ejaculatory duct
82. Ovarioles are [Pg-114,E]
A) bundles of ova B) ovarian tubules
C) immature ovaries D) capsule containing fertilized ova
83. Match the following columns. [Pg-114,M]
Column-I **Column-II**
a Ovarioles (1) Opening of ejaculatory duct
b Gonopore (2) Chain of developing ova
c Phallomere (3) Bundles of sperms
d Spermatophore (4) External genitalia
Select the correct option
- | | a | b | c | d |
|------|----------|----------|----------|----------|
| A) 3 | 2 | 1 | 4 | |
| B) 4 | 3 | 2 | 1 | |
| C) 1 | 4 | 3 | 2 | |
| D) 2 | 1 | 4 | 3 | |

84. Which of the following structure encase the fertilized eggs of cockroaches? [Pg-114,E]
 A) Spermatheca B) Ovarirole C) Cocoon D) Ootheca
85. Select the incorrect statement.[Pg-114,115,M]
 A) Female cockroaches produce one ootheca at a time.
 B) The nymphs of cockroach resemble adults.
 C) The nymphs of cockroach moults about 13 times to reach adult form.
 D) Only adult cockroaches have wings.
86. The following figure is related to head region of cockroach. Identify A to F. [Pg-112,E]



	A	B	C	D	E	F
A)	Compound eye	Ocellus	Maxilla	Mandible	Labrum	Labium
B)	Ocellus	Compound eye	Mandible	Maxilla	Labrum	Labium
C)	Ocellus	Compound eye	Mandible	Maxilla	Labium	Labrum
D)	Ocellus	Compound eye	Maxilla	Mandible	Labium	Labrum

87. Match the following columns. [Pg-113,114,115,M]

Column-I

- a Collateral gland
 b Titillator
 c Gonapophysis

Column-II

- (1) Stimulatory organ in male
 (2) Anal appendage which helps in oviposition
 (3) Helps in the formation of egg cases

Select the correct option

- | | | |
|----------|----------|----------|
| a | b | c |
| A) 2 | 3 | 1 |
| B) 1 | 2 | 3 |
| C) 3 | 1 | 2 |
| D) 2 | 1 | 3 |

- 88.

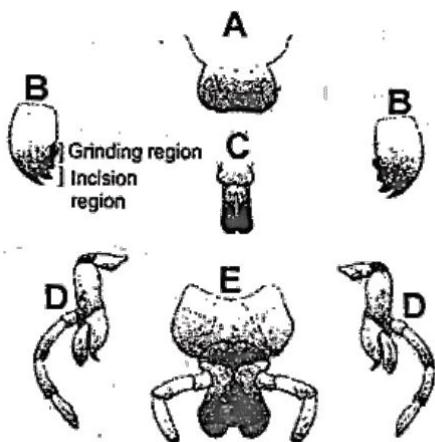


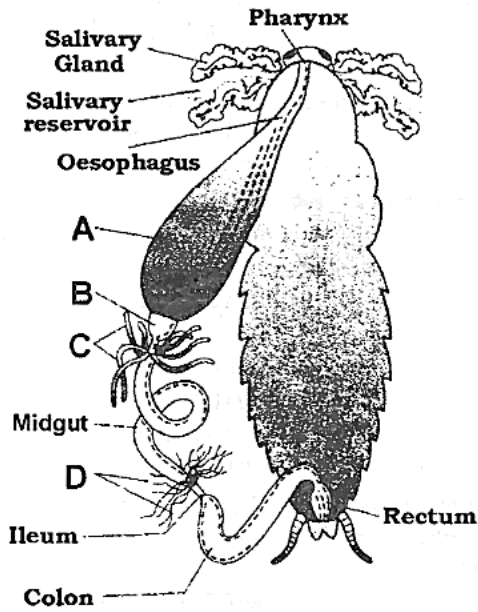
Fig. Mouthparts of cockroach.

The above figure is related with mouth parts of cockroach. Identify A to E –

	A	B	C	D	E
A)	Maxilla	Hypopharynx	Labium	Mandible	Labrum

B)	Mandible	Labium	Maxilla	Labrum	Hypopharynx
C)	Labrum	Mandible	Hypopharynx	Maxilla	Labium
D)	Labium	Hypopharynx	Labrum	Maxilla	Mandible

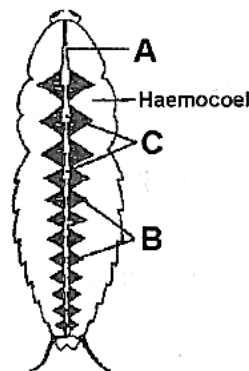
89.



Identify structures A to D –

A	B	C	D
A) Gizzard	Crop	Hepatic caecae	Malpighian tubules
B) Crop	Gizzard	Hepatic caecae	Malpighian tubules
C) Crop	Gizzard	Malpighian tubules	Hepatic caecae
D) Gizzard	Crop	Malpighian tubules	Hepatic caecae

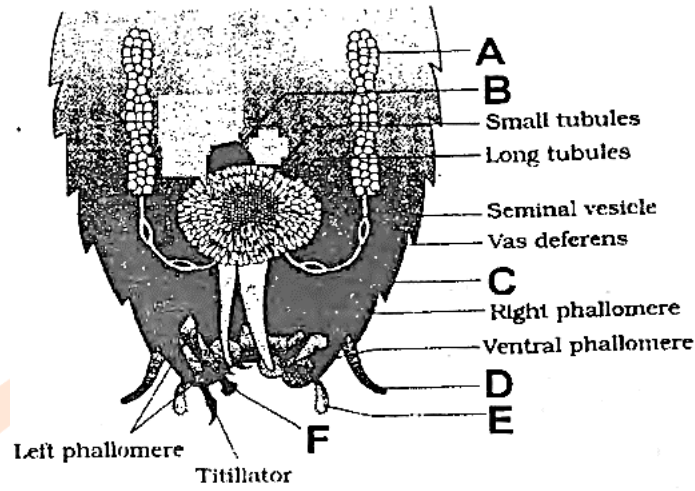
90.



The above figure shows open circulatory system of cockroach. Identify A, B and C.

A	B	C
A) Posterior aorta	Alary muscles	Chambers of hear
B) Anterior aorta	Ciliary muscles	Chambers of hear
C) Anterior aorta	Alary muscles	Chambers of hear
D) Anterior aorta	Ciliary muscles	Chambers of Hear

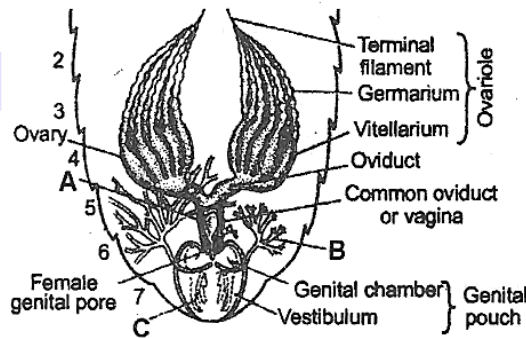
91.



Identify A to F in above diagram –

- | | | | |
|-----------------------|---------------------|---------------------|---------------------|
| A)
A Testis | B)
Testis | C)
Testis | D)
Testis |
| B Collateral gland | Collateral gland | Phallic gland | Phallic gland |
| C Ejaculatory duct | Ejaculatory duct | Ejaculatory duct | Ejaculatory duct |
| D Anal cercus | Terga | Anal cerci | Caudal style |
| E Caudal style | Caudal style | Caudal style | Caudal style |
| F Pseudopenis | Pseudopenis | Pseudopenis | Pseudopenis |

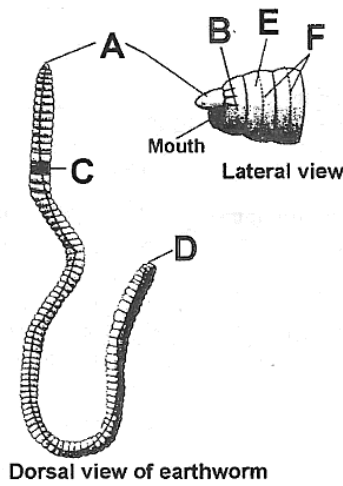
92. Figure refers to reproductive system of female cockroach. The correct labellings indicated by alphabets are respectively-[Pg-115,E]



- | | | |
|------------------|--------------------|--------------|
| A | B | C |
| A) Spermatheca | Collateral glands, | Gonapophyses |
| B) Phallic gland | Collateral glands, | Gonapophyses |
| C) Spermatheca | Seminal vesicles, | Gonapophyses |
| D) Spermatheca | Collateral glands, | Tegmina |

**PARA-7.3 AND 7.5
EARTHWORM AND FROG**

93.



Go through the above figure. Identify A to F.

- | | | | |
|---|--|---|---|
| <p>A)
 A. Peristomium
 B. Prostomium
 C. Clitellum
 D Anus
 E Metameres
 F Ring of setae</p> | <p>B)
 Prostomium
 Peristomium
 Clitellum
 Anus
 Metameres
 Ring of setae</p> | <p>C)
 Prostomium
 Peristomium
 Endostem
 Anus
 Metameres
 Ring of setae</p> | <p>D)
 Prostomium
 Peristomium
 Endostem
 Cloaca
 Metameres
 Ring of setae</p> |
|---|--|---|---|

94.

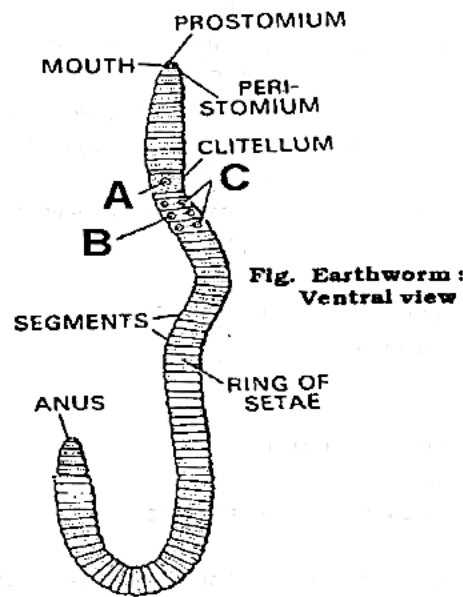
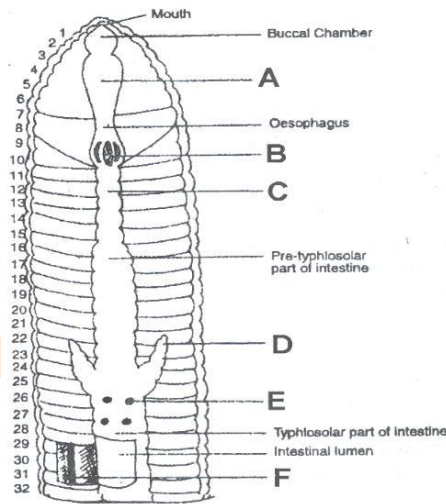


Fig. Earthworm : Ventral view

Choose the correct option of labelling from the options given-

- | | | |
|--|---|---|
| <p>A
 A) Excretory pore
 B) Male genital pore
 C) Female genital pore
 D) Female genital pore</p> | <p>B
 Female genital pore
 Female genital pore
 Genital papilla
 Male genital pore</p> | <p>C
 Male genital pore
 Genital papilla
 Male genital pore
 Genital Papilla</p> |
|--|---|---|

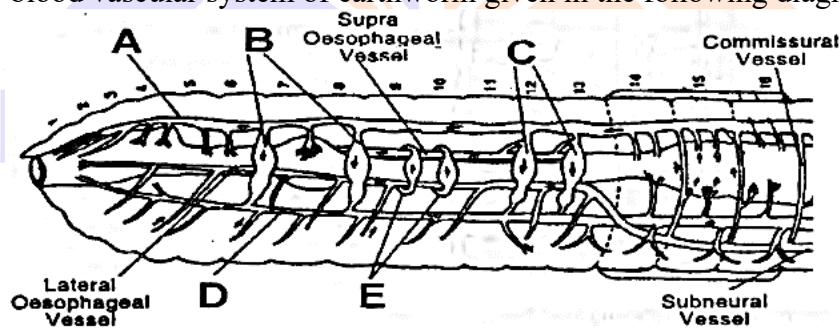
95.



Choose the correct option of labelling from the options given-

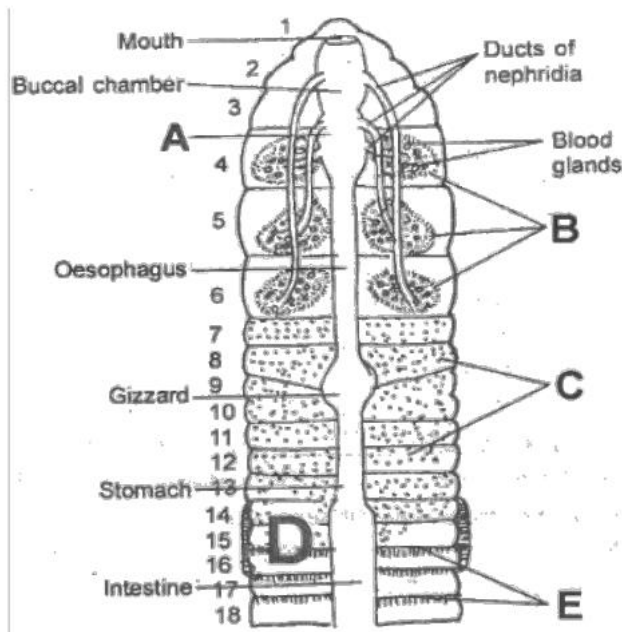
- | | | | |
|----------------|-------------|-------------|------------|
| A) | B) | C) | D) |
| A. Pharynx | Gizzard | Pharynx | Pharynx |
| B. Stomach | Pharynx | Gizzard | Gizzard |
| C. Gizzard | Stomach | Stomach | Stomach |
| D. Caecae | Caecae | Caecae | Liver |
| E. Lymph gland | Lymph gland | Lymph gland | Villi |
| F. Typhlosole | Typhlosole | Typhlosole | Typhlosole |

96. Go through the blood vascular system of earthworm given in the following diagram - [Pg-109,E]



	A)	B)	C)	d)
A	Dorsal vessel	Ventral vessel	Dorsal vessel	Ventral vessel
B	Lateral hearts	Lateral hearts	Lateral hearts	Lateral hearts
C	Lateral oesopharyngeal heart	Lateraloesopharyngeal heart	Anterior loop	Anterior Loop
D	Ventral vessel	Dorsal vessel	Ventral vessel	Dorsa Vessel
E	Anterior loop	Anterior loop	Lateraloesopharyngeal heart	Lateraloesopharyngeal heart

97.

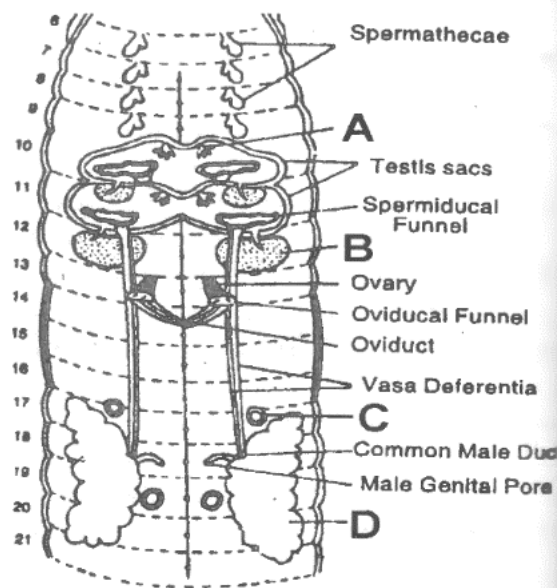


- I. Septal nephridia
- II. Pharynx
- III. Forest of integumentary nephridia
- IV. Integumentary nephridia
- V. Tufts of pharyngeal nephridia

Identify the structures labeled A to E in the diagram given above from the list I to V -

- | A | B | C | D | E |
|-------|-----|-----|-----|-----|
| A) II | I | III | IV | V |
| B) II | V | IV | III | I |
| C) II | IV | V | I | III |
| D) II | III | IV | I | V |

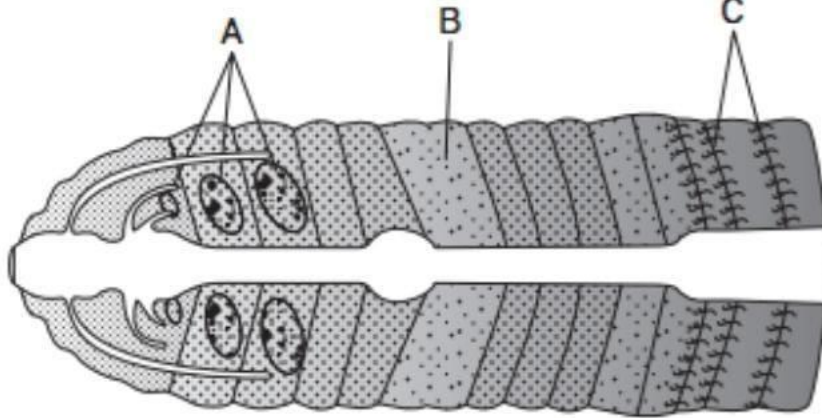
98. Identify A to D in the figure – [Pg-110,E]



- | A | B | C | D |
|--------------------|-----------------|-----------------|----------------|
| A) Testis | Seminal vesicle | Accessory gland | Prostate gland |
| B) Seminal vesicle | Testis | Accessory gland | Prostate gland |

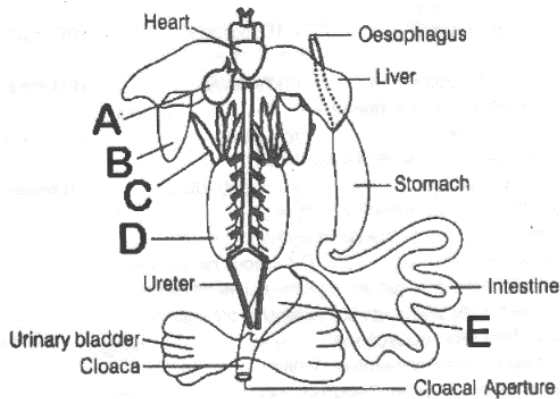
- | | | | |
|--------------------|-----------------|----------------|-----------------|
| C) Testis | Seminal vesicle | Prostate gland | Accessory gland |
| D) Seminal vesicle | Testis | Prostate gland | Accessory gland |

99. Refer to the diagram of nephridial system in earthworm. [Pg-109,E]

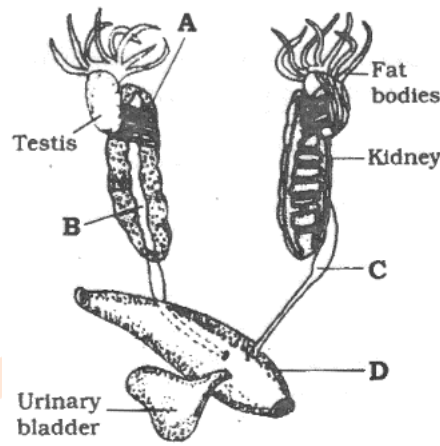


Select the option representing correct characteristic of the labelled structure:

- A) C – Septal nephridia – Open into intestine
 - B) A – Pharyngeal nephridia – Open to outside
 - C) B – Integumentary nephridia – Densely found on first two segments
 - D) All of these
100. The above figure is associated with diagrammatic representation of internal organs of frog. Identify A to E. [Pg-117,E]

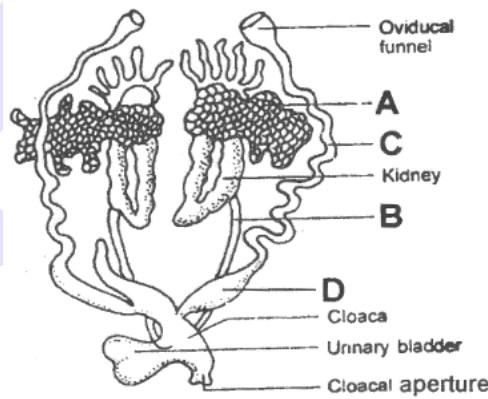


- | | | | |
|----------------|--------------|--------------|--------------|
| A) | B) | C) | D) |
| A Gall bladder | Gall bladder | Gall bladder | Gall bladder |
| B Lung | Lung | Lung | Lung |
| C Ovary | Fat bodies | Testis | Fat bodies |
| D Testis | Testis | Kidney | Kidney |
| E Rectum | Rectum | Rectum | Rectum |
101. Go through the following figure indicating the male reproductive system of frog. Identify A to D [Pg-119,E]



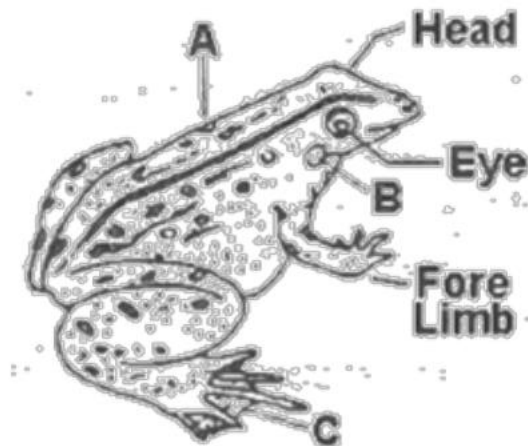
- | A | B | C | D |
|--------------------|---------------|-------------------|--------|
| A. Bidder's canal | Adrenal gland | Urinogenital duct | Rectum |
| B. Bidder's canal | Adrenal gland | Urinogenital duct | Cloaca |
| C. Vasa efferentia | Adrenal gland | Urinogenital duct | Cloaca |
| D. Vasa efferentia | Thyroid gland | Urinogenital duct | Cloaca |

102. The above figure is related with female reproductive system of frog. Identify A to D. [Pg-119,E]



- | A | B | C | D |
|----------|------------------|----------------|---------|
| A) Ovary | Ureter | Oviduct | Ovisac |
| B) Ovary | Urinogenital duc | Bidder's canal | Ovisac |
| C) Ovary | Urinogenital duc | Ovisac | Oviduct |
| D) Ovary | Urinogenital duc | Bidder's canal | Oviduct |

103. Identify A, B and C respectively – [Pg-116,E]



- A) Trunk, Tympanum, Web
- B) Neck, Brown eye spot, Web
- C) Trunk, Tympanum, Hind limb
- D) Neck, Tympanum, Hind limb

NEET PREVIOUS YEARS QUESTIONS

1. Which of the following features is used to identify a male cockroach from a female cockroach? [2018]
 - (a) Presence of a boat shaped sternum on the 9th abdominal segment.
 - (b) Presence of caudal styles.
 - (c) Presence of anal cerci.
 - (d) Forewings with darker tegmina.
2. Frog's heart when taken out of the body continues to beat for sometime. [2017]
 Select the best option from the following statements.

(A) Frog is a poikilotherm.	(B) Frog does not have any coronary circulation.
(C) Heart is "myogenic" in nature	(D) Heart is autoexcitable.

 Options

(a) Only (D)	(b) (A) and (B)	(c) (C) and (D)	(d) Only (C)
--------------	-----------------	-----------------	--------------
3. Which of the following features is not present in *Periplaneta americana*? [2016]
 - (a) Schizocoelom as body cavity.
 - (b) Indeterminate and radial cleavage during embryonic development.
 - (c) Exoskeleton composed of N-acetylglucosamine.
 - (d) Metamerically segmented body.
4. Which type of tissue correctly matches with its location? [2016]
Tissue Location

(a) Smooth muscle Wall of intestine	(b) Areolar tissue Tendons
(c) Transitional epithelium Tip nose	(d) Cuboidal epithelium Lining of stomach
5. The terga, sterna and pleura of cockroach body are joined by _____. [2015]
 - (a) muscular tissue
 - (b) arthrodial membrane
 - (c) cartilage
 - (d) cementing glue
6. The body cells in cockroach discharge their nitrogenous waste in the haemolymph mainly in the form of _____. [2015]
 - (a) potassium urate
 - (b) urea
 - (c) calcium carbonate
 - (d) ammonia
7. Choose the correctly matched pair. [2014]

(a) Tendon-Specialised connective tissue	(b) Adipose tissue - Dense connective tissue
(c) Areolar tissue - Loose connective tissue	(d) Cartilage-Loose connective tissue
8. Choose the correctly matched pair. [2014]
 - (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
9. Consider following features: (NEET-2019)

(a) Organ system level of organisation	(b) Bilateral symmetry
(c) True coelomates with segmentation of body	

 Select the correct option of animal groups which possess all the above characteristics.

(1) Annelida, Arthropoda and Chordata	(2) Annelida, Arthropoda and Mollusca
(3) Arthropoda, Mollusca and Chordata	(4) Annelida, Mollusca and Chordata
10. The ciliated epithelial cells are required to move particles or mucus in a specific direction. In humans, these cells are mainly present in : (NEET-2019)

(1) Bile duct and Bronchioles	(2) Fallopian tubes and Pancreatic duct
(3) Eustachian tube and Salivary duct	(4) Bronchioles and Fallopian tubes

11. Select the correct sequence of organs in the alimentary canal of cockroach starting from mouth: **(NEET-2019)**
- (1) Pharynx → Oesophagus → Crop → Gizzard → Ileum → Colon → Rectum
 - (2) Pharynx → Oesophagus → Gizzard → Crop → Ileum → Colon → Rectum
 - (3) Pharynx → Oesophagus → Gizzard → Ileum → Crop → Colon → Rectum
 - (4) Pharynx → Oesophagus → Ileum → Crop → Gizzard → Colon → Rectum
12. Match the following cell structure with its characteristic feature: **(NEET-2019 (ODISSA))**
- (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 correct option from the following
- (1) (a)-(ii), (b)-(iv), (c)-(i), d-(iii)
 - (2) (a)-(iv), (b)-(ii), (c)-(i), d-(iii)
 - (3) (a)-(iii), (b)-(i), (c)-(iv), d-(ii)
 - (4) (a)-(iv), (b)-(iii), (c)-(i), d-(ii)
13. Which of the following statements is INCORRECT? **(NEET-2019 (ODISSA))**
- (1) Cockroaches exhibit mosaic vision with less sensitivity and more resolution.
 - (2) A mushroom- shaped gland is present in the 6th-7th abdominal segments of male cockroach.
 - (3) A pair of spermatheca is present in the 6th segment of female cockroach.
 - (4) Female cockroach possesses sixteen ovarioles in the ovaries.
14. In cockroach, identify the parts of the foregut incorrect sequence :- **(NEET-2020(COVID-19))**
- (1) Mouth → Oesophagus → Pharynx → Crop → Gizzard
 - (2) Mouth → Crop → Pharynx → Oesophagus → Gizzard
 - (3) Mouth → Gizzard → Crop → Pharynx → Oesophagus
 - (4) Mouth → Pharynx → Oesophagus → Crop → Gizzard
15. Match the following columns with reference to cockroach and select the correct option : **(NEET-2020(COVID-19))**
- | Column - I | Column - II |
|---------------------|---------------------------------------|
| (a) Grinding of | (i) Hepatic caecal the food particles |
| (b) Secrete gastric | (ii) 10 th segment juice |
| (c) 10 pairs | (iii) Proventriculus |
| (d) Anal cerci | (iv) Spiracles |
| | (v) Alary muscles |
- (1) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
 - (2) (a)-(iv), (b)-(iii), (c)-(v), (d)-(ii)
 - (3) (a)-(i), (b)-(iv), (c)-(iii), (d)-(ii)
 - (4) (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv)
16. Select the incorrectly matched pair from following: **(NEET-2020(COVID-19))**
- (1) Chondrocytes - Smooth muscle cells
 - (2) Neurons - Nerve cells
 - (3) Fibroblast - Areolar tissue
 - (4) Osteocytes - Bone cells
17. If the head of cockroach is removed, it may live for few days because **(NEET-2020)**
- 1) the head holds a 1/3rd of a nervous system while the rest is situated along the dorsal part of its body
 - 2) the supra-oesophageal ganalia of the cockroach are situated in ventral part of abdomen
 - 3) the cockroach does not have nervous system
 - 4) the head holds a small proportion nervous system while the rest is situated along the ventral part of its body.

18. Goblet cells of alimentary canal are modified from (NEET-2020)
 1) Compound epithelia cells 2) Squamous epithelial cells
 3) Columnar epithelial cells 4) Chondrocyte
19. Cuboidal epithelium with brush border of microvilli is found in (NEET-2020)
 1) eustachina tube 2) lining of intestine
 3) ducts of salivary glands 4) Proximal convoluted tubule of nephron
20. Which of the following characteristics is incorrect with respect to cockroach? [NEET-2021]
 1. Hypopharynx within the cavity enclosed by the mouth parts
 2. In females, 7th - 9th sterna together form a genital pouch.
 3. 10th abdominal segment in both sexes, bears a pair of anal cerci.
4. A ring of gastric caeca is present at the junction of midgut and hind gut
21. Which of the following statements wrongly represents the nature of smooth muscle? [NEET-2021]
 1) They are involuntary muscles
 2) Communication among the cells is performed by intercalated discs
 3) These muscles are present in the wall of blood vessels
 4) These muscle have no striations
22. 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. [NEET-2021]
 1) Tight (c) junctions and Gap junctions, respectively
 2) Adhering junctions and Tight junctions, respectively
 3) Adhering junctions and Gap junctions, respectively
 4) Gap junctions and Adhering junctions, respectively
23. Following are the statements about prostomium of earthworm [NEET-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
 1) a, b and d are correct 2) a, b, c and d are correct
 3) b and c are correct 4) a, b and c are correct
24. Tegmina in cockroach, arises from: [NEET-2022]
 1) Prothorax 2) Mesothorax
 3) Metathorax 4) Prothorax and Mesothorax
25. Which of the following is not a connective tissue? [NEET-2022]
 1) Blood 2) Adipose tissue 3) Cartilage 4) Neuroglia
26. Match List-I with List-II [NEET-2022]
List-I **List-II**
 (a) Bronchioles (i) Dense Regular Connective Tissue
 (b) Goblet cell (ii) Loose Connective Tissue
 (c) Tendons (iii) Glandular Tissue
 (d) Adipose Tissue (iv) Ciliated Epithelium
 Choose the correct answer from the options given below:
 1) (a) -(iv), (b) -(iii), (c) -(i), (d) -(ii) 2) (a) -(i), (b) -(ii), (c) -(iii), (d) -(iv)
 3) (a) -(ii), (b) -(i), (c) -(ii), (d) -(i) 4) (a) -(iii), (b) -(iv), (c) -(ii), (d) -(i)

NCERT LINE BY LINE QUESTIONS – ANSWERS

1) B	2) B	3) A	4) C	5) B	6) C	7) A	8) C	9) D	10) C
11) A	12) C	13) C	14) A	15) D	16) C	17) C	18) B	19) D	20) A
21) B	22) A	23) D	24) D	25) C	26) B	27) A	28) C	29) A	30) C
31) B	32) D	33) B	34) A	35) C	36) D	37) D	38) D	39) B	40) C
41) A	42) B	43) D	44) B	45) C	46) B	47) D	48) D	49) C	50) A
51) B	52) A	53) D	54) A	55) A	56) C	57) A	58) D	59) A	60) B
61) B	62) D	63) D	64) D	65) B	66) B	67) B	68) D	69) C	70) B
71) C	72) D	73) C	74) D	75) C	76) A	77) A	78) A	79) B	80) D
81) B	82) A	83) D	84) D	85) A	86) B	87) A	88) C	89) B	90) C
91) C	92) A	93) B	94) C	95) C	96) A	97) B	98) A	99) D	100) D
101) A	102) C	103) A							

NEET PREVIOUS YEARS QUESTIONS-ANSWERS

1) b	2) c	3) b	4) a	5) b	6) a	7) c	8) c	9) 1	10) 4
11) 1	12) 3	13) 1	14) 4	15) 1	16) 1	17) 4	18) 3	19) 4	20) 4
21) 2	22) 1	23) 4	24) 2	25) 4	26) 1				

NEET PREVIOUS YEARS QUESTIONS-EXPLANATIONS

1. (b) Males bear a pair of short, thread like anal styles which are absent in females. Anal/caudal styles arise from 9th abdominal segment in male cockroach.
2. (c) The vertebrates possess myogenic heart which is self contractile system or autoexcitable, it will thus, keep working outside the body for sometime.
3. (b) *Periplanata americana* shows spiral and determinate types of cleavage during embryonic development which is a feature of protostomes.
4. (a) Wall of intestine is made of smooth muscle. Tendons consist of dense regular connective tissue fascicles encased in dense irregular connective tissue sheaths. Tip of nose consists of squamous epithelium. Lining of epithelium is made of columnar epithelium.
5. (b) Between the various sclerite, a flexible membrane exists which is known as arthroal membrane.
6. (a) The body cells in cockroach discharge their nitrogenous waste in the haemolymph as a solution of sodium or potassium urate (a weak alkaline fluid).
7. (c) Tendon is dense regular connective tissue. Adipose tissue is a type of loose connective tissue located mainly beneath the cells. Cartilage is a type of specialised connective tissue.
8. (c)
 - (i) Inner lining of salivary ducts - Compound epithelium.
 - (ii) Moist surface of buccal cavity - Compound epithelium.
 - (iii) Tubular parts of nephorns - Cuboidal epithelium.
 - (iv) Inner surface of bronchioles - Ciliated epithelium.
17. The head holds a small proportion of a nervous system while the rest is situated along the ventral part of its body
18. Goblet cells of alimentary canal are modified from columnar epithelial cells.
19. Cuboidal epithelium with brush border of microvilli is found in proximal convoluted tubule of nephron

20. In cockroach gastric or hepatic caeca are present at the junction of fore gut and midgut. Gastric caeca at the junction of mid gut and hind gut is incorrect
21. * **Option (2) is incorrect because intercalated discs are found only in cardiac muscle tissue.**
* Smooth muscle fibres are non-striated and involuntary in nature and are present in the wall of blood vessels, uterus, gall bladder, alimentary canal etc.
22. Adhering junctions help to stop the leakage of the substances across a tissue and Gap junctions help in facilitation of communication with neighbouring cells via rapid transfer of ions and molecules
23. * The anterior end of the earthworm has mouth which has covering called prostomium.
* Prostomium acts as a wedge to force open cracks in the soil.
* Prostomium has receptors, so it is sensory in function.
* The first body segment of earthworm is the peristomium
24. Tegmina-1st pair of wings arise from Mesothorax
25. Neuroglia is supporting cells of neural tissue.
26. Branchioles – Cilated epithelium
Goblet – Glandular tissue
Tendon – Dense regular CT
Adipose – loose C.T



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