

Solutions

S1. Ans.(a)

Correct answer is option (a), because in both sexes of cockroach, 10th segment bears a pair of jointed

filamentous structures called anal cerci.

Options (b), (c) and (d) are incorrect because 5th, 8th and 9th segments do not bear such structures. In

adult cockroaches only 10th segments are present in abdomen. 11th abdominal segment is absent.

S2. Ans.(a)

The correct answer is option (a) as

Figure (a) represents skeletal muscle fibres which are closely attached to skeletal bones. In a typical

muscle such as triceps and biceps, striated muscle fibres are bundled together in a parallel fashion.

Figure (b) represents smooth muscle fibres which are present in the wall of internal organs such as the

blood vessels, stomach and intestine.

Figure (c) represents cardiac muscle fibres which are exclusively present in the heart.

S3. Ans.(b)

The correct answer is option no. (b) as

A. Unicellular glandular epithelium (III)
Goblet cells of alimentary canal

B. Compound epithelium (IV) Lines moist surface of buccal cavity

C. Multicellular glandular epithelium (I)
Salivary glands

D. Endocrine glandular epithelium (II)
Pancreas

S4. 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.

S5. 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.

S6. 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 .

S7. 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.

S8. Ans.(b)

- 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.

S9. Ans.(b)

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.

S10. Ans.(a)

Is the correct answer because anal styles are present in male cockroaches and absent in female cockroaches.

S11. Ans.(d)

Is the correct answer as ciliated epithelium is mainly present in the inner lining of hollow organs like bronchioles and fallopian tubes.

S12. 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

S13. 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.

S14. Ans.(a)

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

S15. Ans.(d)

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

S16. 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.

S17. Ans.(b)

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

S18. 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.

S19. Ans.(d)

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

S20. Ans.(b)

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

S21. 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.

S22. Ans.(b)

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

S23. Ans.(b)

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

S24. 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.

S25. 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.

S26. 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.

S27. 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.

S28. 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.

S29. Ans.(d)

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

S30. Ans.(a)

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

S31. Ans.(b)

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

S32. Ans.(d)

Sperms in male frogs migrate in the following manner:

Testes → Vasa efferentia → Kidney → Bidder's

canal → Urinogenital duct → Cloaca

S33. Ans.(d)

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

S34. Ans.(a)

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

S35. 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).

S36. Ans.(c)

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

S37. Ans.(b)

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

S38. 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.

S39. 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).

S40. 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.

S41. Ans.(b)

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

S42. 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.

S43. 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.

S44. 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.

S45. Ans.(b)

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

S46. Ans.(d)

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