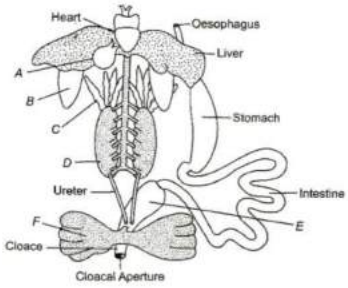
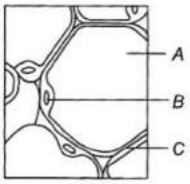
STRUCTURAL ORGANISATION IN ANIMALS

1. Lymphoid tissue is found in
   a) Thymus b) Tonsils c) Lymph nodes d) All of these
2. Earthworm lives in the burrows made by boring and swallowing the soil to
   a) Uptake food b) Get moisture c) Procreation d) Avoid opponents
3. Which of the following cells are round and biconcave in shape?
   a) White blood cells b) Red blood cells
   c) Columnar epithelial cells d) Nerve cells
4. Given below the diagram of internal organs of frog and identify *A* to *F*



   a) A-Gall bladder, B-Lungs, C-Testis, D-Kidney, E-Urethra, F-Urinary bladder
   b) A-Gall bladder, B-Lungs, C-Fat bodies, D-Kidney, E-Rectum, F-Urinary bladder
   c) A-Gall bladder, B-Lungs, C-Ovary, D-Kidney, E-lleum, F-Urinary bladder
   d) A-Gall bladder, B-Lungs, C-Fat bodies, D-Kidney, E-Colon, F-Urinary bladder
5. The clitellum divides the body of earthworm into ..... regions
   a) 3 b) 2 c) 4 d) 5
6. Identify *A*, *B* and *C* in the given diagram of adipose tissue



   a) A-Cytoplasm, B-Nucleus, C-Cell wall
   b) A-Fat storage area, B-Mast cell, C-Plasma membrane
   c) A-Cell fluid, B-Collagen fibres, C-Plasmalemma
   d) A-Fat storage area, B-Nucleus, C-Plasma membrane
7. How many litres of blood is present in normal human body?
   a) 6.8 L b) 6.0 L c) 5.9 L d) 7.2 L
8. Lining of body cavities, ducts and tube are made up of
   a) Compound epithelium b) Simple epithelium
   c) Cuboidal epithelium d) Keratinised epithelium
9. Which of the following metalloprotein is found in the blood of earthworm?
   a) Haemoglobin b) Hemerytherin c) Hemocyanin d) Myoglobin
10. Histamine, serotonin and heparin are secreted by
    a) Lymphocytes b) Monocytes c) Neutrophils d) Basophils
11. Find out the wrongly matched pair.

a) Squamous epithelium - Skin of frog
b) Columnar epithelium - Peritoneum of body cavity
c) Ciliated epithelium - Bronchioles
d) Stratified squamous epithelium - Oesophagus

12. The body wall of the earthworm is covered by which of the following layers (externally-internally)?
a) Epidermis, cuticle, coelomic epithelium, longitudinal muscle, circular muscles
b) Cuticle, epidermis, circular muscles, coelomic epithelium, longitudinal muscle
c) Non-cellular cuticle, epidermis, circular muscles, longitudinal muscles, coelomic epithelium
d) Coelomic epithelium, epidermis, cuticle, circular muscles, longitudinal muscles

13. The number of pairs of cranial nerves arising from the brain of frog is
a) 10 b) 9 c) 8 d) 7

14. The ova of the earthworms are fertilised by the sperm within the
a) Cocoon b) Seminal vesicles c) Soil d) None of the above

15. Which of the following tissues provides a covering layer for some of the body parts?
a) Connective tissues b) Muscular tissues
c) Epithelial tissues d) Neural tissues

16. Consider the following statements about the connective tissue
I. Their special function is linking and supporting the other organs tissue of the body
II. It is the most abundant type of animal tissue
III. Blood is a specialised connective tissue which contains collagen
IV. The cells of connective tissue secretes mucous
Which of the statement given above are incorrect?
a) I and II b) II and III c) III and IV d) I, II, III and IV

17. Which of the following type of connective tissue is present at the tip of human nose?
a) Cartilage b) Bone c) Adipose tissue d) None of these

18. The tissue which forms the glands in humans is
a) Muscular tissue b) Nervous tissue c) Epithelium tissue d) Connective tissue

19. How many species of *Pheretima* are found all over the world?
a) 200 b) 300 c) 400 d) 500

20. In which of the following segments of earthworm, septal nephridia is present?
a) 15-last b) 8-15 c) 18-last d) 15-17

21. Which of the following part of the alimentary canal of cockroaches is used for storing food?
a) Crop b) Gastric caecae c) Gizzard d) Oesophagus

22. In earthworm, pharyngeal nephridia are present as three paired tufts in the segments
a) 3rd, 4th and 5th b) 4th, 5th and 6th c) 5th, 6th and 7th d) 6th, 7th and 8th

23. ..... type of junction is found in the epithelium and other tissues. Fill up the blank by using a suitable word
a) Two b) Three c) One d) Four

24. Which of the following is a sense organ pair in cockroach?
a) Antennae and eyes
b) Maxillary palp and labial palps
c) Antennae and anal cerci
d) All of the above

25. Which one is an iron storage protein?
a) Myosin b) Glutelin c) Ferritin d) Immunoglobulin

26. WBC_S accumulate at site of wound by
a) Hypertension b) Arteriosclerosis c) Haemopoiesis d) Diapedesis

27. Cells of areolar tissues that produces or secrete fibres are called
a) Fibroblast b) Mast cells c) Macrophage d) Adipocytes

28. Hypopharynx of the cockroach acts as
a) Mouth b) Lips c) Tongue d) Jaws

29. The frogs have the ability to change its colour to hide them from their enemies. This protective colouration is called
a) Hibernation b) Aestivation c) Mimicry d) Camuflage

30. Agranulocytes are
a) Lymphocytes and monocytes
b) Eosinophils and basophils
c) Lymphocytes and eosinophils
d) Basophils and monocytes

31. Which of the following is not a function of epithelium?
a) Protection
b) Connection
c) Secretion or excretion
d) Adsorption

32. In cockroaches, stink gland is found in
a) 4th and 5th terga
b) 5th and 6th terga
c) 5th and 6th sterna
d) 4th and 5th sterna

33. Animal tissues are categorised into four basic types on the basis of
a) Function and origin
b) Structure and functions
c) Functions only
d) Origin and structures

34. The number of vasa efferentia that arises from testes in frog's male reproductive system is
a) 9 – 12 b) 10 – 12 c) 13 – 16 d) 16 – 19

35. The multilobed nucleus and granular WBCs are
a) Eosinophils b) Neutrophils c) Lymphocytes d) Monocytes

36. Which of the following is not correctly matched?
a) Cartilage – Limbs and hands in adults
b) Blood – Fluid connective tissue
c) Tendons – Connects bone to bone
d) Adipose tissue – Blubber of whales

37. Red cell count is carried out by
a) Haemocytometer
b) Haemoglobinometer
c) Sphygmomanometer
d) Electrocardiogram

38. Which of the following are the examples of saccular glands?
a) Oil and milk glands of humans
b) Sweat gland in mammals
c) Brunner's gland in humans
d) None of the above

39. Tendons helps in connecting
a) Muscles to bones b) Bone to bone c) Bone of cartilage d) Cartilage to muscle

40. The leucocytes contain, which of the following in large quantity?
a) Basophils b) Neutrophils c) Eosinophils d) Monocytes

41. A complete set of the mouth part of cockroach consists of
a) Labrum and labium
b) Labium, labrum and tongue
c) Larum, mandibles, maxillae and labium
d) Labrum, maxillae and labium

42. In which of the following muscle fibres intercalated disc occurs?
a) In non-striped muscles
b) Between cardiac muscle fibres
c) At the junction of muscle and nerve cells
d) In striped muscles

43. Which of the following part of cockroach's alimentary canal secretes digestive juices?
a) Malphigian tubule b) Proventriculus c) Caecae d) Crop

44. Consider the following statements related to *Rana tigrina* and select the correct option stating which are true and which are false
I. Hindlimbs are larger and muscular than forelimbs
II. The alimentary canal of frog is short

III. They respire on the land through skin only
IV. They contains two-chambered heart
I II III IV
a) T F T F b) F F T T c) F T T F d) T T F F

45. During inflammation, which of the following is secreted by connective tissue?
a) Heparin b) Histamine c) Serotonin d) Glucagon

46. Given below the functions of different parts of the alimentary canal of cockroach. Correlate these functions with their respective organs
I. Grinding of food particles
II. Secretion of digestive juices
III. Clearing of haemolymph
The correct set of organs is
a) I. Malpighian tubule
II. Proventericulus
III. Hepatic caecae
b) I. Proventriculus
II. Gastric caecae
III. Malpighian tubule
c) I. Gastric caecae
II. Gizzard
III. Malpighian tubule
d) I. Gizzard
II. Crop
III. Malpighian tubule

47. The compound eyes of cockroaches consists of about
a) 200 hexagonal ommatidia b) 2000 hexagonal ommatidia
c) 20 hexagonal ommatidia d) 20,000 hexagonal ommatidia

48. In frog, for the digestion of food, wall of the stomach secretes
a) Pepsins and renin b) Amylase and tryptophanase
c) HCl and gastric juices d) HCl and pepsin

49. The major constituent of connective tissue is
a) Vitamin b) Carbohydrate c) Lipid d) Collagen

50. The body of earthworm is divided into
a) 100-120 metamers b) 150-200 metamers
c) 250-300 metamers d) 300-350 metamers

51. Which of the following gland is present in man but not in frog?
a) Thyroid gland b) Salivary gland c) Pancreas d) Liver

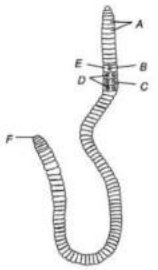
52. Endothelium of blood vessels is made up of
a) Simple cuboidal epithelium b) Simple squamous epithelium
c) Simple columnar epithelium d) Simple non-ciliated columnar epithelium

53. Ciliated epithelium is present in
a) Trachea b) Ureter c) intestine d) Nasal chamber

54. In water, the skin of the frog performs the function of
a) Osmosis b) Plasmolysis c) Diffusion d) Thermoregulation

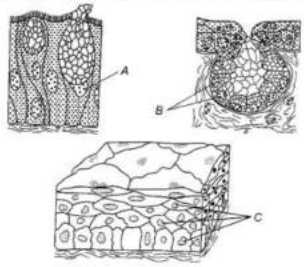
55. Which type of tissue is present in human heart?
a) Epithelial tissue b) Muscular tissue and neural tissue
c) Connective tissue d) All of the above

56. Given below the diagram of the ventral view of earthworm's body. Identify A to F and choose the correct combination of options



a) A-Setae, B-Female genital aperture, C-Male genital aperture, D-Genital papillae, E-Clitellum, F-Anus
b) A- Anus, B- Setae, C-Male genital aperture, D- Female genital aperture, E-Genital papillae, F- Clitellum
c) A-Setae, B- Male genital aperture, C- Female genital aperture, D-Genital papillae, E-Clitellum, F-Anus
d) A-Nephridiopores, B- Setae, C-Nuclei, D-Metamers, E-Prostomium, F-Anus

57. Identify *A*, *B* and *C* in given figures and choose the correct combination of options



a) A-Unicellular gland, B-Multicellular gland, C-Multilayered cells
b) A-Multicellular gland, B-Unicellular gland, C-Squamous epithelium
c) A-Goblet gland, B-Multicellular gland, C-Columnar epithelium
d) A-Flattened cell, B-Multilayered cells, C-Transitional epithelium

58. Consider the following statement about frog's digestive system
I. Food is captured by the bilobed tongue
II. Partially digested food is called chyme. It is passed from the stomach to the first part of intestine
III. Bile digests carbohydrates and proteins
IV. Inner wall of the intestine contains cilia
Which of the above given statement are incorrect?
a) I and II b) II and III c) III and IV d) I and IV

59. The cell junctions called tight, adhering and gap junctions are found in
a) Muscular tissue b) Connective tissue c) Epithelial tissue d) Neural tissue

60. The principal role of setae in earthworm is
a) Respiration b) Excretion c) Locomotion d) Assimilation

61. In addition to the Malpighian tubules, excretion of the waste products in cockroach occurs by
a) Fat bodies b) Nephrocytes c) Urecose glands d) All of these

62. Which of the following organ is not present on earthworm?
a) Peristomium b) Copulatory papillae
c) Tail d) Setae

63. Setae helps in the locomotion of earthworm but is not present uniformaly in all the segments of the earthworm segments. Select among the following that represent setae
a) 1st segment
b) Last segment
c) Clitellar segment
d) All except those metioned in options (a), (b) and (c)

64. Earthworm reacts to the chemical stimuli due to the presence of
a) Mechanical receptor b) Photoreceptor c) Eyes d) Chemoreceptors

65. Find out the pair in reference to the earthworm, which is not correctly matched
a) Clitellum – Secretes cocoon

b) Blood plasma – Contains haemoglobin
c) Setae – Defence against predators
d) Typhosole – Absorption

66. Which of the following structures is *Pheretima* is correctly matched with its function
a) Clitellum – Secretes cocoon
b) Gizzard – Absorbs digested food
c) Setae – Defence against predators
d) Typhosole – Storage of extra nutrients

67. Fertilisation and development in earthworms occurs with in the
a) Spermthecae
b) Cocoon
c) Prostate gland
d) Seminal vesicles

68. Cardiac muscles are
a) Striated and voluntary
b) Striated and involuntary
c) Smooth and voluntary
d) Smooth and involuntary

69. Keratinized dead layer of skin is made up of
a) Stratified squamous epithelium
b) Simple cuboidal epithelium
c) Simple columnar epithelium
d) Stratified columnar epithelium

70. Rh factor is present in
a) All vertebrates
b) All mammals
c) All reptiles
d) Man and rhesus monkey only

71. Which of the following statement is/are incorrect in refer one to earthworms?
I. They are soft and naked and hence, cannot survive in the dry earth
II. They respire through the nasal openings
III. They decaying organic matter of the soil forms their chief food
IV. Rain makes the earth soft for burrowing
a) I and IV
b) II and III
c) II and IV
d) II and III

72. Consider the following statements about respiratory system of frog
I. Skin acts as a respiratory organ in water as well as on land
II. Dissolved oxygen is exchanged through the skin by the process of diffusion in water
III. Lungs are paired and present in thorax
IV. Gaseous exchange takes place through the skin during hibernation and aestivation
Which of the statements given above is are incorrect?
a) Only I
b) I and II
c) I, II and III
d) II and IV

73. Which of the following connective tissue does not contain collagen?
a) Cartilage
b) Bone
c) Blood
d) Adipose

74. In male frog, ureters act as
a) Urinogenital ducts
b) Cloaca
c) Urinary bladder
d) Lymphatic system

75. The development of *Periplanata americana* is
a) Holometabolous
b) Paurometabolous
c) Ametabolous
d) Hemimetabolous

76. Consider the following statements in accordance to the excretory system of the earthworm
I. Nepridia is segmentally arranged coiled tubule
II. Nephridia regulates the volume and composition of the body fluids
III. There are three type of nephridia found in the earthworm
IV. Pharyngeal nephridia is present as three paired tufts in the 4th, 5th and 6th segment
Which of the above statement is/are correct?
a) Only I
b) I and IV
c) I, II and III
d) I, II, III and IV

77. Septal nehphridia of earthworm opens into the
a) Stomach
b) Lining of body wall
c) Intestine
d) Coelomic chamber

78. The type of tissue lining present on the ducts of salivary gland and pancreas is
a) Columnar epithelium
b) Cuboidal epithelium
c) Compound epithelium
d) Glandular epithelium

79. In which of the following body segments of cockroach wings are not present?
a) Mesothorax b) Metathorax c) Prothorax d) Prethorax

80. Cutaneous respiration occurs in
a) Earthworm b) Frog c) Cockroach d) Rabbit

81. Numerous minute pores opens on the surface of the body of earthworm are called
a) Setae b) Nephridiopores c) Spermatospore d) None of the above

82. The ..... in frog acts as a chemical messenger which controls and coordinate the functioning of various organs of the body
a) Blood b) Hormones c) Plasma d) Haemoglobin

83. Blood is a kind of
a) Areolar tissue b) Connective tissue
c) Fluid connective tissue d) Reticular connective tissue

84. Which of the following cell is rounded and biconcave in shape?
a) WBCs b) RBCs c) Epithelial cells d) Nerve cells

85. During the process of blood coagulation, vitamin-K helps in the
a) Formation of thromboplastin b) Formation of prothrombin
c) Conversion of prothrombin to thrombin d) Conversion of fibrinogen to fibrin

86. During blood clotting, which of the following is used?
a) Co b) Ca^{+} c) Na^{+} d) CI^{-}

87. ..... pair of spermathecae are located in .....segments of earthworm
a) Two, 7th-8th b) Three, 9th-11th c) Four, 6th-9th d) One, 3th-5th

88. Adipose tissue is a type of
a) Loose connective tissue b) Dense connective tissue
c) Specialised connective tissue d) None of the above

89. Blood platelets are found only in the blood of
a) Birds b) Reptiles c) Mammals d) Amphibians

90. Fibroblasts, macrophages and mast cells are present in
a) Cartilage tissue b) Adipose tissue
c) Areolar tissue d) Glandular epithelium

91. During respiration in frog, the hyoid and floor of the buccal cavity are raised with the help of
a) Sternohyal muscles b) Petrohyal muscles c) Ligaments d) Intercoastal muscles

92. Bones are made up of
a) Magnesium phosphate b) Sodium chloride
c) Calcium phosphate d) Phosphorus

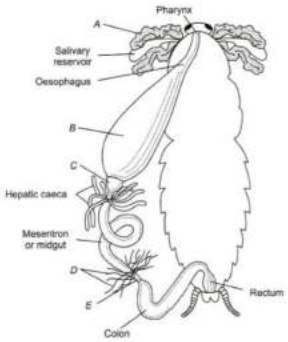
93. In frog, microvilli is present in
a) Intestine b) Stomach c) Oesophagus d) Buccal cavity

94. Vagina, oesophagus and urethra contain which type of tissue?
a) Stratified squamous epithelium b) Simple squamous epithelium
c) Ciliated epithelium d) Columnar epithelium

95. Collagen is a
a) Phosphoprotein b) Globulin c) Derived protein d) Scleroprotein

96. Goblet cells of alimentary canal are a type of
a) Intercellular gland b) Multicellular gland c) Unicellular gland d) None of these

97. Given below the figure of alimentary canal of cockroach. Identify A to E and choose the correct combination of A to E/A to F



a) A-Salivary gland, B-Gizzard, C-Crop, D-Villi, E-Caecum
b) A-Salivary gland, C-Crop, B-Gizzard, D-Malpighian tubules, E-lleum
c) A-Salivary gland, B-Gizzard, D-Malpighian tubule, D-Cilia, E-lleum
d) A-Salivary gland, C-Crop, D-Malpighian tubule, B-Gizzard, E-lleum

98. Urinary bladder is..... in frogs
a) Mutilobed b) Absent c) Unilobed d) Bilobed

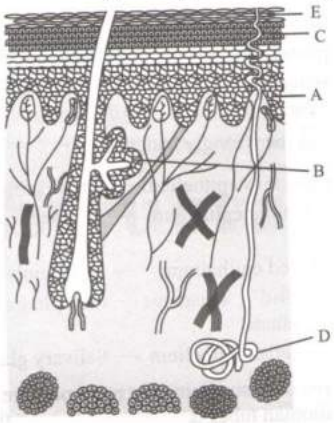
99. The number of teeth in the lower jaw of frog is
a) Two b) Four c) Three d) None of these

100. Pseudostratified epithelium is found in
a) Pharynx b) Trachea c) Testis d) Epidermis

101. The largest tergal part in cockroach is
a) Mesonotum b) Metanotum c) Pronotum d) Plurae

102. Which of the following epithelium is composed of single layer of tall and slender cells?
a) Cuboidal epithelium
b) Columnar epithelium
c) Ciliated epithelium
d) Glandular epithelium

103. In the diagram given below, parts labeled as 'A', 'B', 'C', 'D' and 'E' respectively represent



a) A Stratum granulosum,
B Sweat gland,
C Stratum germinativum,
D Sebaceous gland,
E Stratum corneum

b) A Stratum granulosum,
B Sebaceous gland,
C Stratum germinativum,
D Sweat gland,
E Stratum corneum

c) A Stratum germinativum,
B Sweat gland,
C Stratum lucidium,
D Sebaceous gland,
E Stratum corneum

d) A Stratum germinativum,
B Sebaceous gland,
C Stratum lucidium,
D Sweat gland,
E Stratum corneum,

104. Universal blood recipient is

a) Blood group-O b) Blood group-AB c) Blood group –A d) Blood group-B

105. Which of the following statement is/are correct in relation with epithelial tissue?
I. It helps in protection and storage
II. It helps in excretion and reproduction
III. It helps in absorption and secretion
IV. It helps in locomotion
a) Only IV b) Only II c) All except IV d) All except III

106. The blubber is formed by
a) Elastic tissue b) Reticular tissue c) Adipose tissue d) Fibrous tissue

107. With the help of the following, identify the correct sequence, that leads to the formation of blood clot
I. Blood clot II. Injury
III. Factor II IV. Factor III
V. Factor IV VI. Fibrinogen
VIII. Thorambin
a) II→III→IV→VI→VII→I
b) $II \rightarrow III \rightarrow VII \rightarrow VI \rightarrow I \xrightarrow{FI} IV\uparrow e^{+} \xleftarrow{+e}$
c) IV→II→III→VII→VI→I↑ e^{+}
d) II→IV→III→VI→VII→I↑ e^{+}

108. In frog, a solid muscular organ situated in the upper part of the body cavity is
a) Heart b) Intestine c) Lungs d) Kidney

109. The dorsal surface of the earthworm's body is marked by
a) Genital pores b) Mouth c) Heart d) Blood vessel

110. Erythropoiesis starts in
a) Kidney b) Liver c) Spleen d) Red bone marrow

111. The most active phagocytic white blood cells are
a) Neutrophils and eosinophils
b) Lymphocytes and macrophages
c) Eosinophils and lymphocytes
d) Neutrophils and monocytes

112. Cingulum of the earthworm is concerned with
a) Copulation b) Burrowing c) Cocoon formation d) Spermatogenesis

113. Tendons and ligaments are specialized types of
a) Nervous tissue b) Muscular tissue c) Epithelial tissue d) Connective tissue

114. Which of the following has a triple helix structure?
a) Haemoglobin b) Keratin c) Lysozyme d) Collagen

115. The first segment of earthworm's body, which contains mouth is called
a) Prostomium b) Peristomium c) Coelom d) Protractor

116. You are required to draw blood from patient and to keep it in a test tube for analysis of blood corpuscles and plasma. You are also provided with the following four types of test tubes, which of them will you not use for the purpose?
a) Test tube containing calcium bicarbonate
b) Chilled test tube
c) Test tube containing heparin
d) Test tube containing sodium oxalate

117. In which of the following tissue preparations, signet ring appearance is obtained?
a) Epithelial tissue
b) Dense connective tissue
c) Adipose tissue
d) Reticular tissue

118. Tissue is
a) A group of similar cells together with their associated cell intercellular substances which perform a specific function
b) A single cell with specified functions
c) Composed of a single layer with cube-like cells
d) None of the above

119. The alimentary canal of frog is short because frogs are
a) Herbivores b) Carnivores c) Omnivores d) Heterotrophs

120. Which of the following exhibits sexual dimorphism?

a) Frogs b) Leech c) Earthworm d) Butterfly

121. Which of the following statements is associated with epithelium?
a) Cells are compactly packed with little intercellular matrix
b) Cells are loosely packed with large intercellular matrix
c) It is highly vascularised
d) It is a supporting tissue

122. The common Indian earthworm are
a) *Pheretima* and *Tigrina* b) *Pheretima* and *Hirudo*
c) *Pheretima* and *Terrestris* d) *Pheretima* and *Lumbricus*

123. The vascular system of the frog is
a) Open type b) Closed type c) Double circulatory d) Portal

124. Ductless glands in human beings produces
a) Saliva b) Bile c) Hormones d) Mucous

125. Read the given statements about blood vascular system of cockroach
I. Circulatory system of cockroach is of closed type
II. It contains no blood vessels except aorta heart
III. Heart is 6 chambered
IV. The haemolymph is composed of colourless plasma and haemocytes
Which of the statements given above is/are incorrect
a) Only I b) I, II and III c) I and III d) Only IV

126. Which statement is correct about simple cuboidal epithelium?
a) It consists of a single layer of cube-like cells
b) It is commonly found in ducts of glands
c) Its main function is secretion and absorption
d) All of the above

127. In a frog's body, which of the following is the largest gland?
a) Liver b) Pancreas c) Gall bladder d) Stomach

128. Tendons and ligaments are
a) Epithelial tissue b) Fibrous connective tissue
c) Nerve tissue d) Muscular tissue

129. Read the given statements reference to the digestive system of cockroach
I. Alimentary canal is divided into three regions
II. Oesophagus opens into a sac like structure called crop
III. The hind gut is broader than mid gut
IV. The rectum opens through the anus
Which of the statements given above is/are incorrect?
a) I and IV b) II and III c) III and IV d) None of the above

130. The study of internal structure of an organism as revealed by dissection is known as
a) Morphology b) Anatomy c) Internal appearance d) Physiology

131. On the basis of structures and functions animal tissues are classified into
a) 3 types b) 2 types c) 1 type d) 4 types

132. The columnar epithelium in human body is found in
a) Stomach b) Lungs c) Kidney d) Fallopian tube

133. Earthworm feeds upon
a) Small animals b) Small plants
c) Organic matter and decaying leaves d) All of the above

134. If a live earthworm is pricked with a needle on its other surface without damaging its gut, the fluid that may come out is
a) Slimy mucous b) Excretory fluid c) Coelomic fluid d) Haemolymph

135. In frog, the blood from the heart is carried to all part of the body by

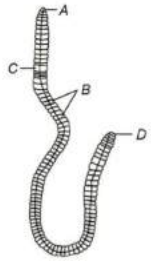
a) Arteries b) Veins c) Vena cava d) Venules

136. Which of the following is the most abundant component of the human blood?
a) RBCs b) Sodium (Na^+) c) Blood platelets d) Cholesterol

137. From earthworm, two pairs of testes are present in the segments
a) 10th-11th b) 11th-12th c) 12th-13th d) 13th-14th

138. Which one of the following leucocytes transforms into macrophages?
a) Eosinophil b) Basophil c) Monocytes d) Lymphocyte

139. Identify *A*, *B*, *C* and *D* in the given figure of dorsal view of earthworm's body and choose the correct combination of option given below



a) A-setae, B-Clitellum, C-Genital papillae, D-Anus
b) A-Peristomium, B-Cilium, C-Male genital aperture, D-Base
c) A-Prostomium, B-Metameres, C-Clitelium, D-Anus
d) A-Annuli, B-Grooves, C-Metameres, D-Anus

140. Which of the following statements are incorrect in reference to the blood vascular system of the earthworm?
I. Blood vascular system is of open type
II. Smaller blood vessels supply the gut, nerve cord and the body wall
III. Blood glands are present on 6th 7th and 8th segment
IV. Blood cells are phagocytotic in nature
a) Only I b) I and IV c) I and III d) II and III

141. Which of the following part of the cockroach helps in the removal of excretory products from the haemolymph?
a) Rectum b) Malpighian tubule c) Lleum d) Cloaca

142. Blood of a cockroach contains
a) Plasma and leucocytes b) Erythrocytes and plasma
c) Erythrocytes and platlets d) All of these

143. Which one of the following cells is not a phagocytic cell?
a) Macrophage b) Monocyte c) Neutrophil d) Basophil

144. Most radiosensitive tissue of body is
a) Bone marrow b) Platelet c) Nervous tissue d) Lymphocyte

145. Squamous epithelium is found in the walls of
a) Air sacs of lungs b) Kidney c) Fallopian tube d) Salivary glands

146. Consider the following statements
I. Cells are compactly packed in the epithelial tissues with little intercellular matrix
II. The cells secretes fibres of structural protein in all the connective tissues expect blood
III. Neuroglea is made up of more than one half the volume of neural tissue in our body
IV. Muscles are made up of fibres
Which of the above given is/are true?
a) Only I b) I and III c) I and II d) I, II, III and IV

147. In a tissue the structure of cells varies according to their
a) Origin b) Function c) Gene content d) None of these

148. In the hindlimb of the frog number of fingers is
a) Six b) Five c) Three d) Four

149. Which of the following activity is harmful for earthworm?
a) Soil erosion b) Scavenging c) Fish bile d) Food

150. Role of spleen in mammals is to
a) Control blood pressure b) Assist liver
c) Act as haemopoietic tissue d) Assist kidneys

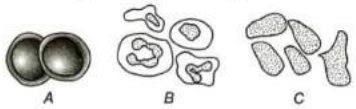
151. Each segment of the cockroach exoskeleton has hardened plates called
a) Sclerites b) Carples
c) Arthrodial membrane d) Ossicles

152. In earthworm, copulatory papillae are present on segment
a) 17th to 19th b) 19th to 21st c) 21st to 23rd d) 23rd to 25th

153. In male reproductive the system of frog ...A... are 10-12 in number that arises from the testes. They enters the ...B... on their sides and opens into ...C...
Identify A to C to complete the given statement
a) Far bodies, kidney, adrenal gland
b) Mesorchium, adrenal gland, urinary bladder
c) Vasa efferentia, kidney, bladder's canal
d) Vasa efferentia, kidney, urinogenital duct

154. Haemoglobin is
a) An oxygen carrier in human blood b) A protein used as food supplement
c) As oxygen scavenger in root nodules d) A plant protein with high lysine content

155. Identify the given figure and select the correct option pertaining to the series *A*, *B* and *C*



a) A-Adipoctye, B-RBC, C-WBC b) A-Platelets, B-WBC, C-RBS
c) A-RBC, B-WBC, C-Platelets d) A-Macrophages, B-RBC, C-Adipocyte

156. Which of the following nephridia in earthworm remain attached to the lining of the body wall of segment 3 to the last?
a) Integumentary b) Pharyngeal c) Septal d) Dorsal

157. Nerve cells are the part of
a) Epithelial tissue b) Connective tissue c) Muscles tissue d) Nervous tissue

158. In human body neuroglia cells occurs in the
a) Liver b) Brain
c) Kidney d) Brain and spinal cord

159. Histamine and heparin are secreted by
a) Monocytes b) Neutrophils c) Eosinophils d) Basophils

160. Epimysium, perimysium and endomysium are found in
a) Nerve b) Blood vessel c) Striated muscle d) Uterus

161. Carefully read the given statements about neurons and neuroglial cells of nervous tissue
I. Neuroglial make up more than one-half volume of the neural tissue in our body
II. Neuroglial cells protects and support the neurons
III. Axon and dendrons are the part of neurons
IV. When neuron is suitably stimulated, an electrical disturbance is generated, which travels along its cytoplasm
Choose the correct statements form above given option
a) I and II b) Only II c) III and IV d) Only IV

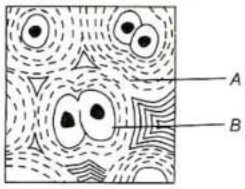
162. The abdomen of both male and female cockroaches consists of
a) 9 segments b) 7 segments c) 10 segments d) 12 segments

163. Lymphocytes are formed by
a) Plasma cells b) Mast cells c) Liver cells d) None of these

164. Which among the following is not a characteristic of yellow fibres of connective tissue?
a) Presence of elastin
b) Fewer in number
c) Straight and branched
d) Provide toughness and strength

165. In earthworm, a single female genital pore is present in the mid-ventral line of the segment number
a) 14 th
b) 16 th
c) 15 th
d) 17 th

166. In the given diagram of T.S. cartilage, identify *A* and *B*



a) A-Collagen; B-Chondrocyte
b) A-Osteocyte; B-Collagen
c) A-Microtubule; B-Osteocyte
d) A-Chondrocyte; B-Collagen

167. Which of the following statements are incorrect regarding ciliated epithelium?
I. Cells possess cilia on their free surface
II. They bear microvilli at the free ends to increase surface area of the organ
III. Mucous spreads over the epithelium as a thin layer
IV. It is found in the lining of the small intestine
a) I and III
b) I and II
c) II and IV
d) III and IV

168. Which of the following helps in blood coagulation?
a) Leucocytes
b) Monocytes
c) Lymphocytes
d) Thrombocytes

169. The entire body of cockroach is covered by
a) Skin
b) Shell
c) Hard chitinous exoskeleton
d) Keratin

170. The contractile tissue that is present only in the heart is
a) Cardiac tissue
b) Areolar tissue
c) Adipose tissue
d) All of these

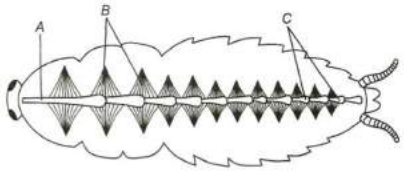
171. The skin of frog is slippery and smooth due to the presence of
a) Mucous
b) Gelatin
c) Waxy skin
d) Mucilage

172. During aestivation and hibernation of frog gaseous exchange takes place through the
a) Skin
b) Nose
c) Lungs
d) Scales

173. Which of the following segments in the earthworm's body are having no setae?
a) First
b) Last
c) Clitellum
d) All of these

174. Achilles tendon is associated with
a) Gluteus muscle
b) Hamstring muscle
c) Quadriceps muscle
d) Gastrocnemius muscle

175. Given below the figure of open circulatory system of cockroach. Identify *A*, *B* and *C* choose the correct options



a) A-Lateral aorta, B-Ciliary muscles, C-Chambers of heart
b) A-Internal aorta, B-Alary muscles, C-Chambers of heart
c) A-Anterior aorta, B-Alary muscles, C-Chambers of heart
d) A-Posterior aorta, B-Fibrous muscles, C-Chambers of heart

176. Which of the following is the characteristic feature of the earthworm?
a) Aquatic
b) Cave dwellers
c) Burrowing
d) Nest making

177. Which among the following glands is known as ductless gland?
a) Salivary glands
b) Endocrine glands
c) Exocrine glands
d) None of the above

178. Which of the following is the function of spermathecae in the earthworm
a) They receives eggs during copulation
b) They receives and store spermatozoa during copulation
c) It helps in the formation of sperms
d) It receives spermatogonia for maturation

179. In the exoskeleton of the cockroach, sclerites are joined to each other by
a) Ossicles b) Arthrodial membrane c) Amino acids d) Chitin

180. Choose the incorrect statement about skeletal muscles
I. Tissues are closely attached to bones
II. A sheath of tough connective tissue encloses several bundles of muscles fibres
III. These are involuntary in their action
IV. These are present in the blood vessels
a) I and II b) II and III c) III and IV d) I and IV

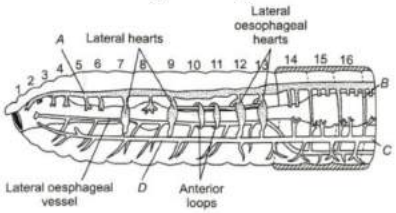
181. In the digestive system of cockroach gastric caecae is present at the junction of
a) Mid gut and hind gut
b) Hind gut and fore gut
c) Fore gut and mouth
d) Mid gut and fore gut

182. Areolar connective tissue joins
a) Fat body with muscles b) Integument with muscles
c) Bones with muscles d) Bone with bones

183. In frog, the main function of the bile juices is
a) Emulsification of fat b) Digestion of carbohydrate
c) Digestion of protiens d) Metabolism of lipids

184. The average diameter of red blood corpuscles of man is
a) 7.2 μ m b) 8.1 μ m c) 9.2 μ m d) 10.3 μ m

185. Observe the given figure of closed circulatory system of earthworm and identify *A*, *B*, *C* and *D*



a) A-Ventral vessel, B-Subneural vessel, C-Commissural vessel, D-Dorsal vessel
b) A-Subneural vessel, B-Ventral vessel, C-Dorsal vessel, D-Commissural vessel
c) A-Dorsal vessel, B-Commissural vessel, C-Subneural vessel, D-Ventral vessel
d) A-Commissural vessel, B-Dorsal vessel, C-Ventral vessel, D-Subneural vessel

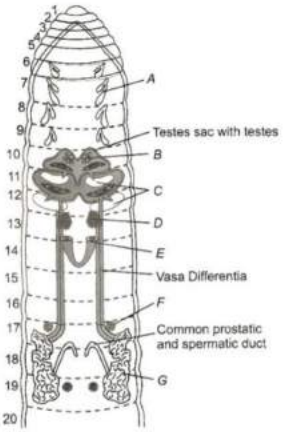
186. Fibroblasts, macrophages and mast cells are seen in
a) Epithelial tissue b) Connective tissue
c) Skeletal muscle tissue d) Smooth muscle tissue

187. The female reproductive system of the cockroach consists of
a) Two large ovaries
b) Three large ovaries
c) One large ovaries
d) Four large ovaries

188. Which of the following tissue performs the function of linking and supporting other tissue of the body?
a) Epithelial tissue b) Muscular tissue c) Connective tissue d) Nervous tissue

189. Which of the following nephridia is also called as enteronephric nephridia in earthworm?
a) Pharyngeal nephridia b) Septal nephridia
c) Integumentary nephridia d) Both (a) and (b)

190. The nymphs of cockroaches grows by moulting about..... times to reach the adult form
a) 6 b) 8 c) 10 d) 13
191. The respiratory system of the cockroach consists of
a) A pair of lungs b) A pair of bronchioles c) A network of trachea d) A network of alveoli
192. Body of frog is divisible into
a) Head and abdomen b) Head, neck, legs and arms
c) Head, neck and abdomen d) Head and trunk
193. The blood does not clot inside the body because of
a) Oxygenation of blood b) Movement of blood
c) Heparin in blood d) Absence of fibrinogen in blood
194. *Pheretima* exhibit ..... type of blood vascular system
a) Portal b) Closed c) Open d) Double circulatory
195. Cells, which help in the formation of bones are called
a) Chondroblasts b) Osteolasts c) Osteoblasts d) Chondroclasts
196. Cockroach are
a) Omnivorous b) Carnivorous c) Herbivorous d) Parasitie
197. Which tissue is present in the lining of small intestine?
a) Epithelial tissue b) Connective tissue c) Nervous tissue d) Muscular tissue
198. Myoglobin is present in
a) All muscle fibres b) White muscle fibres only
c) Red muscle fibres only d) Both (b) and (c)
199. Which type of connective tissue produces antibodies?
a) Mast cells b) Collagenous fibres c) Plasma cells d) None of these
200. In the head region of the cockroach, brain is represented by
a) Supra-oesphageal ganglion b) Ganglia
c) Nerve cord d) Sub oesophageal ganglion
201. Which of the following is the structural and functional unit of kidney in the frog?
a) Ureters b) Cloaca c) Nephrons d) Bidder's canal
202. Which of the following statement is incorrect about squamous epithelium?
a) It consists of a single thin layer of flattened cells with irregular boundries
b) It is present on secretory and absorptive surfaces
c) It is found on the walls of the kidney
d) It is involved in many functions like forming a diffusion boundary
203. Which of the following intersegmental grooves contains four pairs of spermthecal apertures on the ventro-lateral sides of the earthworm?
a) 4th – 8th b) 5th – 9th c) 6th – 10th d) 7th – 11th
204. The skin of frog do not contain
a) Cutaneous glands b) Lymph spaces c) Mucous glands d) Scales
205. Epithelial cells of the intestine involved in food absorption have on their surface
a) Pinocytic vesicles b) Phagocytic vesicles c) Zymogen granules d) Microvilli
206. Heart of frog is
a) Venous heart b) Simple circuit c) Double circuit d) Mixed circuit
207. On which segment of earthworm a pair of short and conical caecae project from the intestine?
a) 28th b) 30th c) 20th d) 26th
208. Which of the following statement is incorrect with reference to the columnar epithelium?
a) It is composed of single layer of tall and slender cells
b) Nucleus of the cell is located at its bases
c) Free surface may have microvilli
d) It is commonly found in kidneys of mammal
209. Go through the given figure of reproductive system of earthworm and label A to G



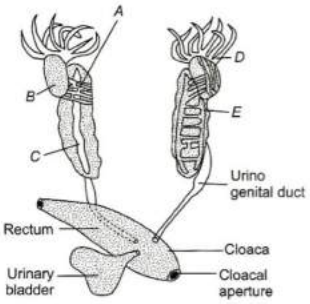
a) A-Ovary, B-Spermathecae, C-Spermiducal funnels, D-Prostate gland, E-Accessory gland, F-Ovarian funnel, G-Seminal vesicles

b) A-Spermathecae, B-Spermiducal funnels, C-Seminal vesicles, D-Ovary, E-Ovarian funnel, F-Accessory gland, G-Prostate gland

c) A-Ovarian funnel, B-Ovary, C-Spermathecae, D-Seminal vesicles, E-Prostate gland, F-Spermiducal funnels, G-Accessory gland

d) A-Seminal vesicles, B-Ovarian funnel, C-Ovary, D-Accessory gland, E-Spermiducal funnels, F-Prostate gland, G-Spermathecae

210. Identify *A*, *B*, *C* and *D* in the given figure of male reproductive system of frog



a) A-Fat bodies, B-Testis, C-Ureters, D-Vasa efferentia, E-Kidney

b) A-Nephrons, B-Testis, C-Ureters, D-Villi, E-Kidney

c) A-Vasa efferentia, B-Testis, C-Adrenal gland, D-Fat bodies, E-Kidney

d) A-Mesorchium, B-Testis, C-Adrenal gland, D-Fat bodies, E-Kidney

211. In frog, cloaca is an opening of

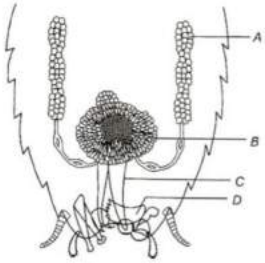
a) Excretory ducts b) Reproductive ducts

c) Both (a) and (b) d) None of these

212. In forg, excess of the bile juices secreted by the liver is stored by

a) Intestine b) Pancreas c) Gall bladder d) Rectum

213. Study the given figure of male reproductive system of cockroach. In which of the following part (*A*, *B*, *C* and *D*) sperms are stored



a) A b) B c) C d) D

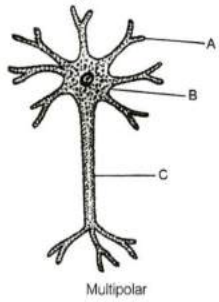
214. Which of the following segments constitute the thorax of the cockroach?

a) Prothorax and prethorax

b) Prothorax and mesothorax
c) Mesothroax and metathorax
d) Prothorax, mesothorax and metathorax

215. Which is not phagocytic?
a) Monocyte b) Lymphocyte c) Mast cell d) Neutrophil

216. Identify *A* to *C* in the given diagram of multipolar neuron



Multipolar

a) A-Dendrites, B-Cyton, C-Axon
b) A-Axon, B-Cyton, C-Dendrites
c) A-Cyton, B-Axon, C-Dendrite
d) A-Axon, B-Dendrites, C-Cyton

217. The cloaca in frog is a common chamber for the urinary tract, reproductive tract and
a) Alimentary canal b) Portal system
c) Hepatic portal vessels d) Notochord

218. This Malpighian tubules in cockroach are present at the junction of
a) Fore gut and mid gut b) Mid gut and hind gut c) Fore gut and hind gut d) Mid gut and gizzard

219. Blood vascular system of the cockroach is of
a) Open type b) Closed type c) Portal type d) None of these

220. The type of epithelial cells, which line the inner surface of fallopian tubes, bronchioles and small bronchi, are known as
a) Squamous epithelium b) Columnar epithelium
c) Ciliated epithelium d) Cubical epithelium

221. Which of the following is not granulocyte?
a) Basophils b) Monocytes c) Acidophils d) Neutrophils

222. Alimentary canal wall contains
a) Striated muscles b) Striped muscles c) Smooth muscles d) None of these

223. Largest single mass of lymphatic tissue in the body is
a) Lung b) Spleen c) Liver d) Kidney

224. Note the following statements.
It forms the lining of the cavities of alveoli of the lungs.
. It forms the lining of wet surface like buccal cavity and oesophagus.
I. It occurs in the ducts of sweat glands.
/. It forms the lining of salivary glands and sweat glands.
It is a loose connective tissue.
Which of the above statements are associated with simple epithelial tissue?
a) I and IV b) II and III c) III and I d) IV and V

225. In earthworm, a pair of male gential pores are present on the ventro-lateral side of the segment
a) 20 th b) 19 th c) 18 th d) 17 th

226. In cockroach, fertilised eggs are stored in
a) Oothcae b) Cocoon
c) Genital pouch of female d) Gonapophyses

227. Excretory system of the frog consists of
a) Pair of kidneys, ureters, urinary bladder, cloaca

b) Single kidney, urinary bladder and cloaca
c) Kidney, and cloaca only
d) Urethra and cloaca only

228. Which of the following does not match?
a) (a) Muscular movement - ATP
b) (b) Heart-pace - maker
c) (c) Monocyte - Haemoglobin
d) (d) Nerve - acetylcholine

229. Gizzard in earthworm help in
a) Emulsifying fat
b) Releasing digestive juice
c) Crushing or grinding food
d) Excretion of waste material

230. Which of the following statement is incorrect regarding connective tissues?
a) They perform the function of linking and supporting the other tissues
b) They are most abundant and widely distributed in the body of animals
c) They are classified into four types
d) They include cartilage, bone, adipose and blood

231. Which of the following statement is correct in reference with the frog?
I. Eyes are bulged and covered by nictitating membrane
II. Membranous tympanum receives the sound signals
III. The frog never drinks water
IV. A pair of nostrils is preset above the mouth
a) I and II
b) III and IV
c) I and IV
d) I, II, III and IV

232. In female cockroach, shape of the 7th sternum is
a) Oval
b) Circular
c) Boat shaped
d) Spiral

233. Which one of the following contains the largest quantity of extracellular material?
a) Stratified epithelium
b) Myelinated nerve fibres
c) Striated muscle
d) Areolar tissue

234. Excretory matter of the earthworm is mainly
a) Nigroneous waste
b) Urea
c) Ammonia
d) None of these

235. Ommatidia of the cockroach is
a) Visual unit
b) Hearing unit
c) Sensory unit
d) None of these

236. Which of the following nephridia is responsible for exonephric excertion in earthworm?
a) Septal nephridia
b) Pharyngeal nephridia
c) Integumentary nephridia
d) All of these

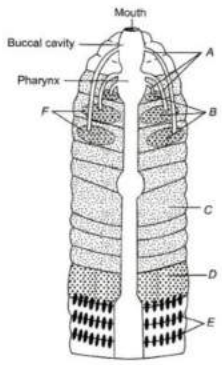
237. Which of the following branch of science deals with the study of externally visible features?
a) Anatomy
b) Morphology
c) Physiology
d) Cytology

238. The midbrain of the frog is characterised by a pair of
a) Cerebral hemisphere
b) Cerebellum
c) Optic lobes
d) Olfactory lobes

239. The process of increasing fertility of the soil by the earthworm is known as
a) Composting
b) Vermicomposting
c) Manuring
d) Green manuring

240. Which of the following statements is/are incorrect with reference to *Rana tigrina*?
I. They do not have constant body temperature
II. Their skin is smooth and slippery due to the presence of a gelatinous sheath
III. Ventral side of the skin is pale yellow in colour
IV. It is also known as bull frog in India
a) I and II
b) II and III
c) Only II
d) I, II, III and IV

241. Examine the given figure of nephridial system in earthworm and identify A, B, C, D, E and F



a) A-Tufts of pharyngeal nepridia, B- Forest of integumentary nephridia, C-Septal nephridia, D-Integumentary nephridia, E-Blood glands, F-Ducts of pharyngeal nephridia

b) A- Forest of integumentary nephridia, B-Septal nephridia, C-Integumentary nephridia, D-Blood glands, E-Ducts of pharyngeal nephridia, F-Tufts of pharyngeal nepridia

c) A-Ducts of pharyngeal nephridia, B-Tufts of pharyngeal nepridia, C-Integumentary nephridia, D- Forests of integumentary nephridia, E-Septal nephridia, F-Blood glands

d) A-Blood vessels, B-Blood gland, C-Septal nephridia, D-dorsal nephridia, E-pharyngeal nephridia, F- Integumentary nephridia

242. Cartilage are distinguished from bone by

a) Chondrin b) Collagen c) Calcium d) Haversian canal

243. The ciliated columnar epithelial cells in humans are known to occur in

a) Bronchioles and fallopian tubes
b) Bile duct and oesophagus
c) Fallopian tubes and urethra
d) Eustachian tube and stomach lining

244. The muscles surrounding the pupil of rabbit's eye are

a) Unstriated and involuntary
b) Striated and voluntary
c) Unstriated and voluntary
d) Striated and involuntary

245. In the respiratory system of cockroach, trachea opens through 10 pairs of small holes called spiracles. The part of integument supporting spiracles is

a) Bronchioles b) Alveoli c) Peritreme d) Tracheoles

246. Microscopic study of tissues is known as

a) Histology b) Microbiology c) Cytology d) Pathology

247. Blood cells of the earthworm are..... in nature

a) Exocytotic b) Endocytotic c) Phagocytotic d) Osmotic

248. Gametes are derived from which of the following tissues in animals?

a) Connective tissue
b) Nervous tissue
c) Germinal epithelial tissue
d) Muscular tissue

249. Life period of mammalian erythrocytes is

a) 120 days b) 180 days c) 140 days d) 220 days

250. Cockroaches are placed in the phylum-Arthropooda because

a) Chewing mouth parts b) Presence of wings c) Chitinous exoskeleton d) Joined appendages

251. Heparin

a) Is antiserum b) Helps in clotting c) Helps in secretion d) Is anticoagulant

252. Identify *A* to *C* in the given diagram of areolar tissue

a) A-Macrophage, B-Fibroblast, C-Collagen fibres
b) A-Mast cells, B-Collagen fibres, C-Plasma membrane
c) A-Chondrocyte, B-Fat storage area, C-Plasma membrane

d) A-fibroblast, B-Macrophages, C-Mast cells

253. Exchange of gases takes place in cockroaches by the process of
a) Diffusion b) Osmosis c) Expiration d) None of these

254. The colour of the ventral side of the forgs skin is
a) Olive green b) Pale yellow c) Brownish d) Lightish black

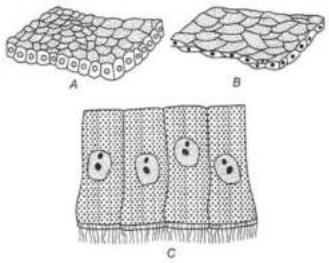
255. Which of the following are the wax secreting cells in cockroach?
a) Trichogen cells b) Tormogen cells c) Oenocytes cells d) Glandular cells

256. Minimum regeneration power is present in
a) Nervous tissue b) Connective tissue c) Epithelial tissue d) None of these

257. How many fertilised eggs are present in the oothecae of cockroach?
a) 14 -16 b) 19 – 24 c) 20 – 25 d) 25 – 30

258. In female cockroach, the 7th sternum together with the 8th and 9th sterna forms a
a) Collateral gland b) Gonopore c) Genital pouch d) Anal cercus

259. Identify A, B and C following figures of simple epithelium tissue



a) A-Ciliated columnar, B-Squamous, C-Cuboidal b) A-Cuboidal, B-Squamous, C-Ciliated columnar
c) A-Squamous, B-Ciliated columnar, C-Cuboidal d) A-Ciliated columnar, B-Cuboidal, C-Squamous

260. *Pheretima* has
a) One eyes b) Two eyes c) No eyes d) Many eyes

261. Debove's membrane is a layer of
a) Muscular tissue b) Epithelial tissue c) Connective tissue d) All of these

262. The type of tissue lining the nasal passage, bronchioles and fallopian tubes is
a) Columnar ciliated epithelium b) Cuboidal epithelium
c) Neurosensory epithelium d) Germinal epithelium

263. Which one of the following human cells do not contain mitochondria?
a) Nerve cell b) Red blood cells c) Liver cell d) White blood cells

264. The process of formation of blood corpuscles is called
a) Haemopoiesis b) Haemolysis c) Haemozoin d) None of these

265. The lining of intestine and kidneys in human is
a) Keratinized b) Brush bordered c) Ciliated d) None of these

266. In male cockroach, genital pouch contains
a) Dorsal anus, ventral genital pore and gonapophysis
b) Dorsal anus, gonopore and gonapophysis
c) Ventral anus, dorsal spermathecal pore, gonapophysis
d) Gonopore, spermathecal, pores and collateral glands

267. The frog is
a) Ureotelic animal b) Ammonotellic animal
c) Urecotelic animal d) None of these

268. The ..... is a straight tube which runs between the first to last segment of the earthworm's body
a) Pharynx b) Intestine c) Stomach d) Alimentary canal

269. In male reproductive system of the cockroach, spermatheca is present in the
a) 7th segment b) 6th segment c) 5th segment d) 4th segment

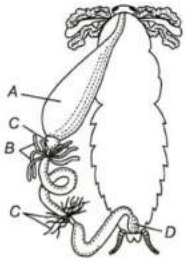
270. How many eyelid membranes are present in frog?
a) One b) Two c) Three d) Four

271. Which of the following statement is incorrect in relation to frog?
I. Development of frog is indirect
II. Frog feeds on small insect, tadpole and smaller frogs
III. Their croaking in the call for mating
IV. They breeds in any season
a) Only I b) II and III c) Only III d) Only IV

272. In cockroaches, spermatozoa are stored in
a) Conglobate gland b) Seminal vesicles c) Testes d) Vas deferens

273. In earthworm, nephridium collects the excess of fluid from the
a) Septal chamber b) Nephridial chamber c) Coelomic chamber d) Gizzard chamber

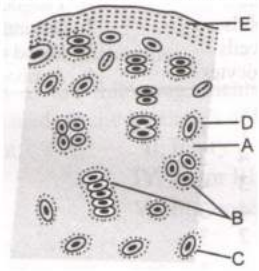
274. Study the given figure of alimentary canal of cockroach. Identify the parts that helps in the removal of excretory products from the haemolymph



a) A b) B c) C d) D

275. The main role of calciferous glands present in stomach of earthworm is
a) Secreting mucous
b) Breaking food particles
c) Absorption of nutrients
d) Neutralising the humic acid present in humus

276. In the diagram of section of hyaline cartilage, the different parts have been indicated by alphabets. Choose the answer in which these alphabets correctly match with the parts they indicate.



a) A-Perichondrium, B-Chondrocyte, C-Lacuna, D-Capsular matrix, E-Chondrin
b) A- Capsular matrix, B- Chondrocyte, C- Lacuna, D- Perichondrium, E- Chondrin
c) A- Chondrin, B- Chondrocyte, C- Lacuna, D- Capsular matrix, E- Perichondrium
d) A- Chondrin, B- Lacuna, C-Chondrocyte, D- Capsular matrix, E- Perichondrium

277. Each organ of human body is made up of one or more type of
a) Tissue b) Cells c) Parts d) Layers

278. In which of these, would you find white fibrous tissue in abundance?
a) Cartilage b) Bone c) Ligament d) Tendon

279. Each muscle is made up of long, cylindrical fibres arranged in parallel arrays. These fibres are composed of numerous fine fibrils called
a) Myofibrils b) Microfilament c) Fibroblast d) None of these

280. Ions that must be present for binding the cross bridges is
a) Na^+ b) Ca^{2+} c) K^+ d) Mg^+

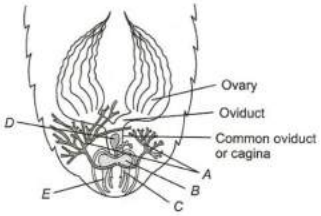
281. Human heart consists of ..... types of tissues
a) Three b) Four c) Two d) One

282. Which of the following statement is incorrect with reference to frog?

a) Teeths are present on the lower jaw of the frog
b) Amplexusory pads develops on the inner finger of each hand of the male frog
c) Brow spot represents the vestigial pineal eye in frog
d) Eggs of frog are mesolecithal and telolecithal

283. Which of the following organs is called the graveyard of RBCs?
a) Thymus b) Liver c) Spleen d) Kidney

284. Identify *A* to *F* in the given diagram of female reproductive system of cockroach



a) A-Colateral glands, B-Vestibulum, C-Genital chamber, D-Spermatheca, E-Gonapophysis
b) A-Vestibulum, B-Colateral gland, C- Gonapophysis, D-Spermatheca, E-Genital chamber
c) A-Colateral gland, B-Genital chamber, C-Vestibulum, D-Spermatheca, E-Gonapophysis
d) A-Genital chamber, B-Spermatheca, C-Colateral gland, D- Gonapophysis, E-Vestibulum

285. In which of the following tissues is the matrix not a product of synthesis of its cells?
a) Muscular tissue b) Osseus tissue
c) Loose connection tissue d) Adipose tissue

286. Compound squamous epithelium is found in
a) Stomach b) Intestine c) Trachea d) Pharynx

287. In earthworms, cocoons are found in
a) 14th, 15th and 16th segment b) 19th, 20th and 22th segment
c) 15th, 16th and 17th segment d) 7th, 8th and 9th segment

288. Choose the incorrect pair from the matches given below
a) Antennae – Sensory receptors b) Metathoracic wings - Flying
c) Malpighian tubule – Excretory role d) Crop – Grinding food

289. Faecal deposits of earthworm are known as
a) Organic matter b) Castings c) Dung d) Manure

290. In the female reproductive system of cockroach ovaries are located in which of the following abdominal segments?
a) 2nd-6th b) 4th-8th c) 6th-2th d) 1st-2nd

291. Blood cells involved in inflammatory reactions are
a) Basophils b) Neutrophils c) Eosinophils d) Monocytes

292. Which of the following are not true cells in the blood?
a) Platelets b) Monocytes c) Neutrophils d) Basophils

293. Which of the following are phagocytic in nature?
a) Netrophil, monocyte and basophil b) Neutrophil, monocyte and macrophage
c) Neutrophil, basophil and macrophage d) Acidophil, basophil and lymphocyte

294. Which of the following is a transparent tissue?
a) Tendon b) Fibrous cartilage c) Hyaline cartilage d) All of these

295. The type of cell junction, which facilitates cell to cell communication is
a) Tight junction b) Adhering junction c) Gap junction d) Desmosomes

296. In cockroach, larval and nymphal characters are maintained by
a) Ecdysone b) Salivary glands c) Parotid glands d) Juvenile hormone

297. Bone marrow is made up of
a) Muscular fibre and fatty tissue b) Fatty tissue and areolar tissue
c) Fatty tissue and cartilage d) Fatty tissue, areolar tissue and blood vessel

298. Which of the following animal is unisexual?

a) Tapeworm b) Sponge c) Leech d) Earthworm

299. Which of the following prevents the conversion of prothrombin to thrombin in an undamaged blood vessel?
a) Heparin b) Calcium ions c) Thromboplastin d) Fibrinogen

300. Find out the wrong match.
a) Eosinophils – allergic response
b) Basophils – secrete histamine and serotonin
c) Neutrophils – phagocytic and destroy foreign organism
d) Monocytes – secrete heparin

301. Forelimbs and hindlimbs of a frog helps in
a) Swimming b) Walking c) Leaping d) All of these

302. In male frog, cloaca is a small median chamber that is used to pass
a) Sperms b) Urine c) Faecal matter d) All of these

303. Select the correct order of classification of *Rana tigrina* up to genus
a) Chordata, Craniata, Amphibia, Gnathostomata, *Rana*
b) Chordata, Craniata, Gnathostomata, Amphibia, *Rana*
c) Chordata, Amphibia, Gnathostomata, Craniata, *tigrina*
d) Chordata, Craniata, Amphibia, Gnathostomata, *tigrina*

304. Collagen fibres are secreted by
a) Mast cells b) Macrophage c) Histiocytes d) fibroblasts

305. Which of the following tissue forms the epidermis of the skin in land vertebrates?
a) None-keratinised stratified squamous epithelium
b) Keratinised stratified squamous epithelium
c) Stratified ciliated columnar epithelium
d) Stratified cuboidal epithelium

306. Adipose tissue perform which of the following the function?
a) Producing fat b) Dissolving fat c) Storing fat d) All of these

307. Which of the following epithelium type helps in the secretion and absorption of nutrients?
a) Cuboidal
b) Stratified squamous
c) Squamous
d) Columnar

308. Myelinated nerve fibres are white coloured because of
a) Chromidial substance b) Neurolemma c) Myelin d) None of these

309. Nails, hoofs and horns are examples of
a) Bone
b) Cartilage
c) Connective tissue
d) Epidermal derivatives

310. In cockroach the heart is
a) Muscular and tube-like
b) Three chambered
c) Membranous
d) Small

311. Which of the following types of cartilage is found in intervertebral disc of mammal?
a) Hyaline cartilage b) Fibrous cartilage c) Calcified cartilage d) Elastic cartilage

312. Which of the following statement is incorrect regarding cockroach (*Periplaneta americana*)?
a) Cockroaches belongs to the phylum – Arthropoda
b) Cockroaches are nocturnal animals
c) Cockroaches are cornivourous animals
d) Cockroaches have long antenna and legs

313. Hypochromic microcytic anaemia and leucopenia are caused by the deficiency of ..... respectively.
a) Pyridoxine and riboflavin
b) Pyridoxine and folacin
c) Biotin and folacin
d) Biotin and cyanocobalamine

314. Carotene pigment is found in the cells of
a) Dermis b) Epidermis c) Adipose cell d) Both (b) and (c)

315. The function of typhosole in earthworm is

a) Grinding soil particles
b) Increasing absorptive area
c) Purifying blood
d) Storing fats

316. Peyer's patches produce
a) Mucus
b) Trypsin
c) Lymphocytes
d) Enterokinase

317. Which of the following statement is/are incorrect *Periplanata americana*?
I. They are nocturnal omnivores that lives in the damp places
II. Its body is segmented and divisible in two region-head and abdomen
III. Antennae have sensory receptor to monitor the environment
IV. Head can move in all direction due to the presence of movable neck
The correction option is
a) I and IV
b) Only II
c) Only IV
d) II and III

318. The mouth part of a cockroach are said to be
a) Absorbing type
b) Biting and absorbing type
c) Biting and chewing type
d) Biting and sucking type

319. The longest podomere in the leg of cockroach is
a) Tibia
b) Trochanter
c) Femur
d) Tarsus

320. In earthworm a nerve cord is
a) Single, spongy and posterior
b) Paired, solid and ventral
c) Paired, hollow and dorsal
d) Single, solid and ventral

321. With the help of the following, identify the correct sequence, that leads to the formation of blood clot.
I.Blood cloth
II.Injury
III.Factor II
IV.Factor III
V.Factor IV
VI.Fibrinogen
VII.thrombin
a) II → III → IV → VI → VII → I
b) II → III → VII → VI → I
$\uparrow e^+$
c) IV $\overset{+e}{\uparrow\leftarrow}$
IV → II → III → VII → VI → I
d) II → IV → III → VI → VII → I
$\uparrow e^+$

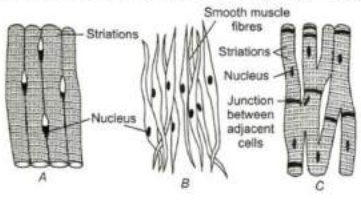
322. In animals, gametes are derived from
a) Germinal epithelial tissue
b) Nervous tissue
c) Connective tissue
d) Muscular tissue

323. Bone marrow of long bones are the sites of
a) Production of WBCs
b) Production of RBCs
c) Production of blood
d) Breakdown of RBCs

324. The outer covering of cartilage is called
a) Peritoneum
b) Periosteum
c) Endosteum
d) Perichondrium

325. In female cockroach, anterior part of the genital pouch contains
a) Gonopore
b) Spermathecal pores
c) Collateral glands
d) All of these

326. Examine the following figures, identify A, B, and C and choose the correct option



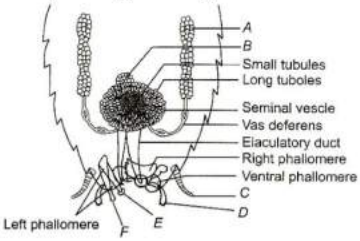
a) A-Skeletal muscle, B-Voluntary muscle, C-Cardiac muscle
b) A-Skeletal muscle, B-Smooth muscle, C-Cardiac muscle

c) A-Cardiac muscle, B-Skeletal muscle, C-Smooth muscle
d) A-Smooth muscle, B-Cardiac muscle, C-Skeletal muscle

327. In earthworm, the alimentary canal open to the exterior by a small rounded aperture known as
a) Mouth b) Stomach c) Anus d) Typhosole

328. The type of epithelium seen in the walls of blood vessels is
a) Squamous epithelium b) Columnar epithelium
c) Ciliated epithelium d) Cuboidal epithelium

329. Study the given figure of male reproductive system of cockroach and identify the following parts



I. Anal cerci II. Testis
III. Pseudo penis IV. Phallic Acid
V. Caudal style VI-Titillator

A B C D E F
a) IV III II I V VI b) II I VI IV II V
c) I II III IV VI V d) II IV I V III VI

330. Earthworm is a
a) Unisexual animal b) Multisexual animal c) Bisexual animal d) Asexual animal

331. The cavities of alveoli of lungs are lined by
a) Cuboidal epithelium b) Columnar epithelium
c) Stratified cuboidal epithelium d) Squamous epithelium

332. Cockroaches can climb smooth or steep surfaces due to the presence of adhesive pads found on the tarsus of their legs
a) Pretarsus b) Arolium c) Plantulae d) Tibia

333. Which of the following types of leucocytes secretes heparin and histamine?
a) Acidophils b) Monocytes c) Basophils d) Neutrophils

334. Earthworm can distinguish the light intensities and fell the viberation in the ground through
a) Eyes b) Mechanical receptor
c) Receptor cells d) Chemoreceptors

335. Which of the following organ regulates the volume and composition of the body fluids of earthworm?
a) Stomach b) Nephridia c) Heart d) Intestine

336. The blood vascular system of the frog consists of
a) Heart, blood vessels and blood without haemoglobin
b) Blood vessels, capillaries and heart of neuroganic type
c) Haemolymph, blood vessels and heart
d) Artries, veins, capillaries heart and blood

337. Which of the following is not a characteristic features of frog?
a) Brow spot b) Hallux c) Amplexusory pads d) None of the above

338. In which one of the following preparations, you likely to come across cell junctions most frequently?
a) Ciliated epithelium b) Thrombocyte c) Tendon d) Hyaline cartilage

339. The kind of tissue that forms the supportive structure in our pinna (external ears) is also found in
a) Vertebrae b) Nails c) Ear ossicles d) Tip of the nose

340. ..... acts as a shock absorber to cushion when tibia and femur came together.
a) Ligament b) Cartilage c) Tendon d) Disc

341. The head capsule of the cockroach bears

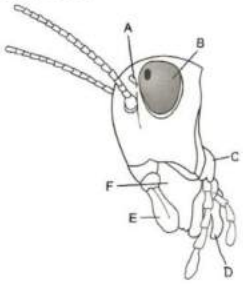
a) No eyes b) One eyes c) Two eyes d) Many eyes

342. In frog, undigested solid waste passes out through
a) Rectum b) Cloaca c) Anus d) Intestine

343. Consider the following statements about *Rana tigrina*
I. The skin of frog sheds after every few weeks
II. Camouflage is a common defensive mechanism of frog
III. Chest muscles are involved in the process of respiration
IV. Their nervous system consists of a brain, spinal cord and nerves
Which of the above statement is incorrect?
a) Only I b) I and III c) Only III d) I and IV

344. Heart of the frog is covered by a membrane called
a) Pericardium b) Plasma membrane c) Pleuromembrane d) Dura matter

345. The given figure is related with the head region of cockroach. Identify *A* to *F* the correct combination of options



a) A-Maxilla, B-Compound eye, C-Ocellus, D-Labrum, E-Labium, F-Mandible
b) A-Ocellus, B-Compound eye, C-Maxilla, D-Labium, E-Labrum, F-Mandible
c) A-Ocellus, B-Compound eye, C-Maxilla, D-Labrum, E-Labium, F-Mandible
d) A-Mandible, B-Compound eye, C-Maxilla, D-Ocellus, E-Labrum, F-Labium

346. The body of the cockroach is segmented and divisible into
a) Head and tail
b) Head and thorax
c) Head and abdomen
d) Head, thorax and abdomen

347. Metamorphosis occur in a life history of
a) Frog b) Earthworm c) Man d) Rat

348. Study the following statements
I. It forms the lining of the cavities of alveoli of the lungs
II. It occurs in the ducts of sweat glands
III. It forms the lining of salivary glands and glands
IV. It is a loose connective tissue
Which of the above statements are associated with the simple epithelial tissue
a) I and III b) II and III c) III and IV d) IV and I

349. Endothelium is made up of
a) Squamous cells b) Cuboidal cells c) Columnar cells d) Stratified epithelium

350. Which of the following sense organ in frogs is not the cellular aggregation around the nerve ending?
a) Eyes
b) Sensory papillae
c) Taste bud
d) Nasal epithelium

351. Bidder's canal is present in
a) Testes of frog b) Kidney of frog c) Kidney of rabbit d) Both (a) and (c)

352. In both the sexes of cockroaches, the 10th segment bears a pair of joined filamentous structure called
a) Anal style b) Anal cerci c) Gonapophysis d) Spermathecal pores

353. Bowman's glands are located in the
a) Proximal end of uriniferous tubules
b) Anterior pituitary gland
c) Female reproductive system of cockroach
d) Olfactory epithelium of nose

354. Matrix secreting cells of cartilage are known as
a) Chondrocytes b) Osteoblasts c) Fibroblasts d) Mast cells

355. In which part of the earthworm sense organs are most concentrated?
a) Posterior part b) Anterior part c) Middle part d) None of these

356. The number of spiracles present in cockroaches are
a) 9 pairs b) 10 pairs c) 12 pairs d) 14 pairs

357. The respiration by lungs in frog is called
a) Pulmonary respiration
b) Pericardial respiration
c) Alveolar respiration
d) None of these

358. For capturing the prey frog uses its
a) Lips b) Teeth c) Tongue d) Hand

359. RBC_S are nucleated in
a) Man b) Rabbit c) Frog d) All of these

360. Consider the following statements about the hind wings of cockroach
I. These are broad and thin
II. They are not used in flying
III. They are also known as mesothoracic wings
IV. They are transparent and delicate
Which of the statements given above is/are incorrect?
a) Only I b) II and III c) I and IV d) I, II, III and IV

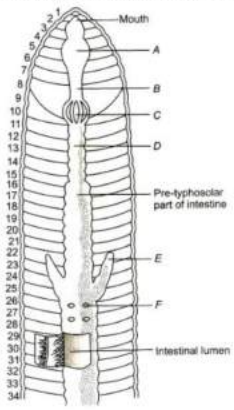
361. In terms of descending order of percentage proportions of leucocytes in human blood, which one is correct?
a) Neutrophils → lymphocytes → monocytes → eosinophils → basophils
b) Neutrophils → basophils → lymphocytes → eosinophils → monocytes
c) Neutrophils → monocytes → lymphocytes → eosinophils → basophils
d) Neutrophils → eosinophils → basophils → lymphocytes → monocytes

362. Mark the odd one.
a) Monocytes b) Lymphocytes c) Neutrophils d) Erythrocytes

363. The epithelial tissue present on the inner surface of bronchioles and fallopian tubes is
a) Cuboidal b) Glandular c) Ciliated d) Squamous

364. Categorisation of secretory gland can be done on the basis of
a) Mode of pouring of their secretion b) Mode of breaking down of molecules
c) Mode of segregation of products d) None of the above

365. Observe the following figure of alimentary canal of earthworm and identify A, B, C, D, E and F



The correct options is
a) A-Oesophagus, B-Pharynx, C-Stomach, D-Gizzard, E-Typhosole, F-Intestine
b) A-Pharynx, B-Oesophagus, C-Gizzard, D-Stomach, E-Intestinal calcum, F-Lymph gland

c) A-Gizzard, B-Pharynx, C-Oesophagus, D-Lymph gland, E-Stomach, F-Typhosole
d) A-Typhosole, B-Gizzard, C-Pharynx, D-Typnosole, E-Lymph gland, F-Stomach

366. In earthworms, secretory gland cells are present on
a) Epidermis b) Nephridopores c) Metameres d) Clitelium

367. Which of the following is known as fossorial animal?
a) Frog b) Earthworm c) Cockroach d) Rabbit

368. The ventral surface of the body of earthworm is distinguished by
a) Blood vessels b) Mouth c) Genital pores d) Segment size

369. Mast cells secrete
a) Serotonin b) Heparin c) Histamine d) All of these

370. Cockroach belongs to
a) Class Insect of phylum – Echinodermata
b) Class Amphibia of phylum – Reptelia
c) Class Insect of phylum – Arthropoda
d) Class Insect of phylum – Annelida

371. Tendon is an example of which of the following connective tissue?
a) Loose connective tissue
b) Dense connective tissue
c) Specialised connective tissue
d) All of the above

372. The number of fingers in the forelimb of frog is
a) Three b) Four c) Five d) Six

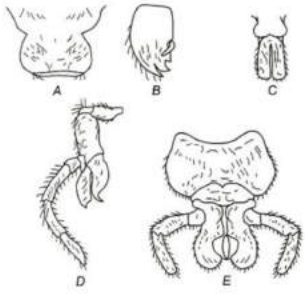
373. Blood glands are present on which segments of the earthworm?
a) 4th, 5th and 6th b) 3rd, 4th and 5th c) 2nd, 3rd and 4th d) 5th, 6th and 7th

374. Hindbrain of a frog consists of
a) Cerebellum and medulla oblongata
b) Olfactory lobes and cerebral hemispheres
c) A pair of optic lobes
d) Cerebrum and cranium

375. Forewings of the cockroach are known as
a) Tegmina b) Spiracles c) Tergia d) Coxa

376. A pair of spermatheca is present in the 6th segment of the cockroach which opens into
a) Genital chamber b) Anus c) Rectum d) Vagina

377. Identify *A*, *B*, *C*, *D* and *E* in a given figure related with mouth parts of the cockroach



a) A-Mandible, B-Labium, C-Labrum, D-Maxilla, E-Hypopharynx
b) A-Labium, B-Labrum, C-Mandible, D-Hypopharynx, E-Maxilla
c) A-Labrum, B-Mandible, C-Hypopharynx, D-Maxilla, E-Labium
d) A-Hypopharynx, B-Maxilla, C-Labium, D-Labrum, E-Mandible

378. Which of the following series of events is correct about the digestive system of frog?
I. Prey → Mouth → Oesophagus → stomach → Small intestine → Cloaca
II. Prey → Mastication by teeth → Stomach → Small intestine → Cloaca
III. Tongue → Prey → Teeth → Stomach → Large intestine → Cloaca
IV. Prey → Mouth → Teeth → Pharynx → Stomach → Small intestine → Rectum
a) Only I b) I and II c) I and III d) III and IV

379. On an average, female cockroach produces ..... oothecae
a) 7 – 8 b) 9 – 10 c) 8 – 9 d) 10 – 11

380. Metamorphosis in frog is initiated by the production of hormone
a) Thyroxine b) Thyroid c) Insulin d) Parathyroxine

381. In earthworm *Pheretima*, a prominent dark band of glandular tissue (clitellum) is present in the segments number
a) 10, 11, 12 b) 13, 14, 15 c) 14, 15, 16 d) 15, 16, 17

382. Which of the following statement is incorrect about the female reproductive system of frog?
I. Reproductive organs includes a pair of ovaries
II. Ovary has functional connections with kidneys
III. A mature female can lay 15000-2000 ova at a time
IV. Oviduct and ureters open separately into the cloaca
a) I and II b) II and III c) I and IV d) II and IV

383. Which of the following functions is/are performed by the of frog's skin?
a) Excretion of waste material b) Absorption of minerals
c) Diffusion of respiratory gases d) All of the above

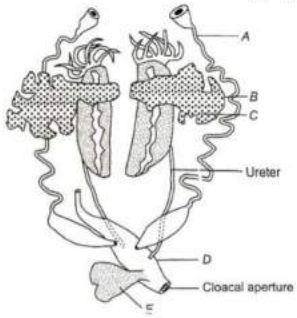
384. Epidermis of the earthworm's body is made up of single layer known as
a) Cuboidal epithelium b) Columnar epithelium
c) Squamous epithelium d) Compound epithelium

385. Three chambered heart of the frog contain
a) Two ventricle and one atria
b) Two atria and one ventricle
c) One auricle and two ventricle
d) One auricle, one ventricle and one atrium

386. Haversian lamellae are the structures found in
a) Hyaline cartilage b) Fibrous cartilage c) Bone marrow d) Myelin sheath

387. A pair of salivary gland in cockroach is present near the
a) Crop b) Gizzard c) Mouth d) Antenna

388. Observe the following figure of female reproductive system of earthworm and identify *A* to *D*



a) A-Urinary duct, B-Ova, C-Ovary, D-Cloaca, E-Urethra
b) A-Oviduct, B-Ovary, C-Ova, D-Cloaca, E-Urinary bladder
c) A-Oviduct, B-Ovary, C-Ova, D-Rectum, E-Adrenal gland
d) A-Urinogenital duct, B-Ovary, C-Ovum, D-Coelom, E-Urethra

389. Blood vascular system of *Pheretima* consists of
a) Vessels, capillaries and heart b) Nerve, veins and heart
c) Lymphs, heart and blood d) Visceral organ, lymph and blood

390. Consider the following statement related to *Pheretima* and select the correct option stating, which ones are true and which are false?
A. It exhibits closed type of blood vascular system
B. It lacks of specialised breathing device
C. Typhosole increases the effective area of absorption in intestine

D. There are two pair of testes present in 10th and 11th segments

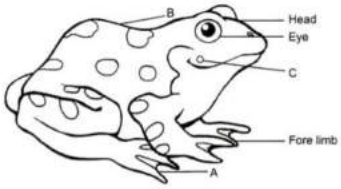
A B C D

a) T F T F b) F F T T c) T T T F d) T T T T

391. A group of similar cells which along with intercellular substances perform a specific function in multicellular organisms are called

a) Organs b) Cell system c) Tissues d) Categories body

392. Identify *A* to *C* in the given picture of frog



a) A-Trunk, B-Tympanum, C-Web

b) A-Web, B-Tympanum, C-Trunk

c) A-Web, B-Trunk, C-Tympanum

d) A-Tympanum, B-Trunk, C-Web

393. Which of the following cells is/are contained in areolar connective tissue?

a) Mast cells b) Fibrobalsts c) Macrophages d) All of these

394. Which of the following is common British frog?

a) *Rana catesbeina* b) *Rana tigrina* c) *Rana temporaria* d) *Rana malabaricus*

395. The common species of frog found in India is

a) *Rana temporaria* b) *Rana cates beiana* c) *Rana tigrina* d) *Rana mandelica*

396. Examples of specialised connective tissue is/are

a) Bone b) Cartilage c) Blood d) All of these

397. Pick out the incorrectly matched pair from the following

a) Sensory papillae – Touch b) Cloaca – Pass sperm and faecal matter

c) Lymph – Contains RBC and proteins d) Buccal cavity – Respiratory organs

398. Which one of the following mammalian cells is not capable of metabolizing glucose to carbon dioxide aerobically?

a) White blood cells b) Unstriated muscle cells

c) Liver cells d) Red blood cells

399. Which part of the gut in *Pheretima* act as a suction pump?

a) Pharynx b) Oesophagus c) Gizzard d) Typhosole

400. Irregular nuclei is present in

a) Neutrophils b) basophils c) Eosinophils d) Monocytes

401. Frog has different types of sense organs

I. Sensory papillae

II. Nasal epithelium

III. Taste buds

IV. Eyes

V. Tympanum with internal ears

Which of these are well organised structures?

a) I and III b) III and IV c) IV and V d) I, II, III and IV

402. Cockroach is

a) Uriotelic b) Uricotelic c) Ammonotelic d) Ureo-ammonotelic

403. Seggregate the given set of statements regarding frog into true and false category

I. Frogs do not have a lymphatic system

II. Frogs are ammonotelic animals

III. Hindlimbs of frog ends in five digits and forelimbs ends in four digits

IV. Female frog contains sound producing vocal sacs which are absent in male frog

a) T, F, T, T b) F, F, F, T c) T, F, T, F d) F, F, T, F

404. Supra-oesopharyngeal ganglion in cockroach supplies the nerves to
a) Antennae b) Compound eyes c) Maxillary palps d) Both (a) and (b)

405. Male frog can be distinguished from female frog due to the presence of
a) Vocal sacs and copulatory pad on the first digit of the forelimb
b) A neck and tail is absent
c) The hind limb ends in the five digits
d) Eyes are bulged and are covered by the nictitating membrane

406. In the mouth parts of cockroach, the glea and lacinia gorms the part of
a) Mandible b) Maxilla c) Labium d) Labsum

407. Consider the given statements about *Periplanata* and select the correct option
A. Blood vascular system is of open type
B. Malpighian tubules helps in the removal of excretory products from the haemolymph
C. They bear no eyes
D. Female bear mushroom glands and male bear collaterial glands
A B C D
a) T F T F b) T T F F c) F F T T d) F T T T

408. Major protein of connective tissue is
a) Melanin b) Collagen c) Keratin d) Myosin

409. Which of the following segment contains the cerebral ganglion in the earthworm?
a) 7 b) 5 c) 6 d) 3

410. The cells which stores the nitrogenous waste in cockroaches are known as
a) Urate cells b) Trophocytes c) Ammonate cells d) None of these

411. In female cockroach, which of the following part is absent?
a) Anal style b) Anal cerca c) Stema d) Tergum

412. The nasal chamber of rabbit has three thin twisted bony plates called conchae. They are lined by
a) Striated cuboidal epithelium b) Simple cuboidal epithelium
c) Simple squamous epithelium d) Simple ciliated columnar epithelium

413. Which one of the following is the correct pairing of a body part and the kind of muscle tissue that moves it?
a) Heart wall- Involuntary unstriated muscle b) Biceps of upper arm – Smooth muscle fibres
c) Abdominal wall – Smooth muscle d) Iris –Involuntary smooth muscle

414. The head of the cockroach show great mobility in all the directions due to
a) Flexible neck b) Absence of neck c) Small size of head d) None of these

415. The skin of frog acts as ...A... in water and on land, the ...B..., ...C... and ...D... acts as respiratory organs. Choose the correct combination in accordance to above statement
a) A-Respiratory organ, B-Buccal cavity, C-Skin, D-Lungs
b) A-Digestive organ, B-Pharynx, C-Mouth, D-Heart
c) A-Purifier, B-Heart, C-Lungs, D-Blood
d) A-Excretory organ, B-Skin, C-Pharynx, D-lungs

416. Heart of the cockroach is
a) 12 chambered b) 13 chambered c) 15 chambered d) 4 chambered

417. The layer of cells forming tissue that appears to be multilayered but actually some of the cells extend from the basement membrane to the surface is
a) Simple columnar epithelium b) Pseudostratified epithelium
c) Stratified columnar epithelium d) Stratified cuboidal epithelium

418. How many pairs of testes are present in earthworm?
a) Five b) Two c) Three d) Four

STRUCTURAL ORGANISATION IN ANIMALS

: ANSWER KEY :

1)	d	2)	b	3)	b	4)	b	165)	a	166)	a	167)	c	168)	d
5)	a	6)	d	7)	a	8)	b	169)	a	170)	a	171)	a	172)	a
9)	a	10)	d	11)	b	12)	c	173)	d	174)	d	175)	c	176)	c
13)	a	14)	a	15)	c	16)	c	177)	b	178)	b	179)	b	180)	b
17)	a	18)	c	19)	d	20)	a	181)	d	182)	b	183)	a	184)	a
21)	a	22)	b	23)	b	24)	d	185)	c	186)	b	187)	a	188)	c
25)	c	26)	d	27)	a	28)	c	189)	d	190)	d	191)	c	192)	d
29)	d	30)	a	31)	b	32)	b	193)	c	194)	b	195)	b	196)	a
33)	b	34)	b	35)	b	36)	c	197)	a	198)	d	199)	c	200)	a
37)	a	38)	a	39)	a	40)	b	201)	a	202)	c	203)	b	204)	d
41)	c	42)	b	43)	c	44)	d	205)	d	206)	d	207)	d	208)	d
45)	b	46)	b	47)	b	48)	c	209)	b	210)	c	211)	c	212)	c
49)	c	50)	a	51)	b	52)	b	213)	b	214)	d	215)	b	216)	a
53)	a	54)	c	55)	d	56)	a	217)	a	218)	b	219)	a	220)	c
57)	a	58)	c	59)	c	60)	c	221)	b	222)	c	223)	b	224)	a
61)	d	62)	c	63)	d	64)	d	225)	c	226)	a	227)	a	228)	c
65)	c	66)	a	67)	b	68)	b	229)	c	230)	c	231)	d	232)	c
69)	a	70)	d	71)	c	72)	a	233)	d	234)	b	235)	a	236)	c
73)	d	74)	a	75)	b	76)	d	237)	b	238)	c	239)	b	240)	c
77)	c	78)	c	79)	c	80)	a	241)	c	242)	d	243)	a	244)	a
81)	b	82)	b	83)	c	84)	b	245)	c	246)	a	247)	c	248)	c
85)	b	86)	b	87)	c	88)	a	249)	a	250)	d	251)	d	252)	a
89)	c	90)	c	91)	a	92)	c	253)	a	254)	b	255)	c	256)	a
93)	a	94)	a	95)	d	96)	c	257)	a	258)	c	259)	b	260)	c
97)	b	98)	a	99)	d	100)	b	261)	c	262)	a	263)	b	264)	a
101)	c	102)	b	103)	d	104)	b	265)	b	266)	a	267)	a	268)	d
105)	c	106)	c	107)	b	108)	a	269)	b	270)	c	271)	d	272)	b
109)	a	110)	b	111)	d	112)	c	273)	c	274)	c	275)	d	276)	c
113)	d	114)	d	115)	b	116)	a	277)	a	278)	d	279)	a	280)	b
117)	c	118)	a	119)	b	120)	a	281)	b	282)	a	283)	c	284)	c
121)	a	122)	d	123)	b	124)	c	285)	a	286)	d	287)	a	288)	d
125)	c	126)	d	127)	a	128)	b	289)	b	290)	a	291)	b	292)	a
129)	d	130)	b	131)	d	132)	a	293)	b	294)	c	295)	c	296)	d
133)	c	134)	c	135)	a	136)	a	297)	d	298)	d	299)	a	300)	d
137)	a	138)	c	139)	c	140)	c	301)	d	302)	d	303)	b	304)	d
141)	b	142)	a	143)	d	144)	a	305)	b	306)	c	307)	d	308)	c
145)	a	146)	d	147)	b	148)	b	309)	d	310)	a	311)	b	312)	c
149)	a	150)	c	151)	a	152)	a	313)	b	314)	d	315)	b	316)	c
153)	c	154)	a	155)	c	156)	a	317)	b	318)	c	319)	a	320)	b
157)	d	158)	d	159)	d	160)	c	321)	b	322)	a	323)	c	324)	d
161)	d	162)	c	163)	d	164)	d	325)	d	326)	b	327)	c	328)	a

329) b	330) c	331) d	332) b	377) c	378) a	379) b	380) a
333) c	334) c	335) b	336) d	381) a	382) b	383) c	384) b
337) d	338) a	339) d	340) b	385) b	386) c	387) a	388) b
341) c	342) b	343) c	344) a	389) a	390) d	391) c	392) c
345) b	346) d	347) a	348) a	393) d	394) c	395) c	396) d
349) a	350) a	351) b	352) b	397) c	398) d	399) a	400) b
353) d	354) a	355) b	356) b	401) c	402) b	403) d	404) d
357) a	358) c	359) c	360) b	405) a	406) b	407) b	408) b
361) a	362) d	363) c	364) a	409) a	410) a	411) a	412) d
365) b	366) a	367) b	368) c	413) d	414) a	415) a	416) b
369) d	370) c	371) b	372) b	417) b	418) b		
373) a	374) a	375) a	376) a				

STRUCTURAL ORGANISATION IN ANIMALS

: HINTS AND SOLUTIONS :

1 **(d)**
Lymphoid tissue consists of spleen, tonsils, lymph nodes, thymus gland, Peyer's patches, liver, etc. Such organs secrete lymph, producing lymphocytes so are known as lymphoid organs. The spleen is the largest mass of lymphatic tissue in the body. Lymphoid tissue share responsibility with myeloid tissue (red bone marrow) for producing agranular leucocytes.

2 **(b)**
Earthworm is a reddish-brown terrestrial invertebrate that lives in the moist soil, rich in humus. They are soft and naked, hence cannot survive in the dry earth. Therefore, they lives in the burrows made by boring and swallowing the soil

3 **(b)**
Red blood cells (RBC_S) or erythrocytes are the most abundant of all the cells in blood. They are devoid of nucleus in most of the mammals and are round or biconcave in shape. It is biconcave because such a shape has increase surface area (for O_2transfer) and allows easy squeezability of the RBC_S through the blood vessels.

4 **(b)**
A-Gall bladder; B-Lungs; C-Fat bodies; D-Kidney; E-Rectum; F-Urinary bladder

5 **(a)**
Clitellum divides the body of earthworm into three regions; preclitellar, clitellar and postclitellar segments

6 **(d)**
A-Fat storage area
B-Nucleus
C-Plasma membrane

7 **(a)**
An average adult person has about 6.8 litres of blood

8 **(b)**
Simple epithelium is composed of a single layer of cells and functions as a lining for body cavities, ducts and tubes

9 **(a)**
In earthworms, the blood glands are present on the 4th, 5th and 6th. They produces blood cells and haemoglobin which gets dissolved in the blood plasma. Blood contains leucocytes only

10 **(d)**
Basophils (one of the types of granulocytes) secrete histamine, serotonin, heparin, etc., and are involved in inflammatory reactions. They are probably like mast cells of connective tissue.

11 **(b)**

Squamous epithelium	- Skin of frog
Columnar epithelium	- Stomach
Ciliated epithelium	- Bronchioles
Stratified squamous epithelium	- Oesophagus
Glandular epithelium	- Salivary gland

12 **(c)**
The body wall of the earthworm is covered by non-cellular cuticle, epidermis, circular muscles and longitudinal muscles, coelomic epithelium

13 **(a)**
There are ten pairs of cranial nerves arising from the brain of frog

14 **(a)**
In *Pheretima* fertilization is external (outside the body) within specialised structures called cocoons. These are hard shell structures containing mature sperms, egs cells and nutritive fluid. These hard structures are developed due to hardening of clitellar secretions

15 **(c)**
Epithelial tissue has a free surface, which faces either a body fluid or the outside environment and thus provides a covering to body parts

16 **(c)**
Specialised connective tissues includes cartilage, bone, adipose and blood. In all connective tissues, except blood the cells secretes collagen. Blood's a

fluid connective tissue containing plasma, RBCs and WBCs. Cells of connective tissues secretes fibres of structural proteins called collagen or elastin. This fibres provides strength, elasticity and flexibility to the tissues

17 **(a)**
Cartilage is a specialised connective tissue, which is solid, pliable and resists compression

18 **(c)**
Glandular epithelium consists of specialised columnar or cuboidal cells, which are specialised for secretion. They may be unicellular, *e. g.*, goblet cells of alimentary canal or multicellular, *e. g.*, salivary gland

19 **(d)**
There are about 500 species of the earthworms all over the world

20 **(a)**
Septal nephridias, present on both the sides of the intersegmental septa from the segment is 15 to the last that opens into the intestine of earthworm's excretory system

21 **(a)**
Crop is a sac-like structure present in the alimentary canal of cockroaches and is used for storing food

22 **(b)**
Pharyngeal nephridia are present as three paired tufts in the segments 4th, 5th, 6th. They discharge excretory matter into the gut (buccal cavity and pharynx) by these paired ducts

23 **(b)**
Three types of junctions found in the epithelium and other tissues are tight junctions, adhering junctions and gap junction

24 **(d)**
In cockroach, the sense organs are antennae, eyes, maxillary palps, labial palps, anal cerci etc.

25 **(c)**
Ferritin is an iron-storing protein found especially in spleen, liver and bone-marrow. Iron, in the form of Fe^{3+}, is made available when required for haemoglobin synthesis.

26 **(d)**
Leucocytes (WBC) can squeeze through pores of thin capillary wall to wander about in tissue. This phenomenon is termed as **diapedesis**.

27 **(a)**
The fibroblasts are the principle cells of the areolar tissue. They are large, flat, stellate cells with long processes and oval nucleus. They secrete matrix and the material of which, the fibres are formed

28 **(c)**
The hypopharynx is a median tongue like, chitinous structure with two pointed lobes

29 **(d)**
The frog have the ability to change the colour to hide them from their enemies. This protective colouration is called camouflage

30 **(a)**
Agranulocytes formed in spleen and lymph nodes are non-granular white blood cells that contain non-lobulated nuclei. These from about 35% of total leucocytes (3.5×10^9 per litre). These are of two types-monocytes and lymphocytes.

31 **(b)**
Connection is not the function of epithelium tissue. It is the function of connective tissue

32 **(b)**
The arthrodial membrane between the 5th and 6th abdominal terga is depressed to form a stink gland. These glands produces a secretion that gives a stinky smell

33 **(b)**
Animal tissues are categorised into four basic types on the basis of their structure and function

34 **(b)**
The number of vasa efferentia that arises from the testes in frog's male reproductive system is 10-12. They enter the kidneys on their sides and open into the Bidder's canal and finally, it communicates with the urinogenital duct that comes out of the kidneys and opens into the cloaca

35 **(b)**
Neutrophils are the most abundant, most active type of granular WBC_S. Nucleus has 5-lobes. They are phagocytic.
Eosinophils are granular WBC_S with bilobed nucleus.
Lymphocytes and **monocytes** are agranular WBC_S.

36 **(c)**
Tendons connects muscle to bond and ligaments connects bone to bone

37 **(a)**
Haemocytometer is an instrument used to determine cell or spore counts such as RBC_S.

38 **(a)**

Saccular glands have wide, spherical, secretory part called acinus. They may be simple or compound. The simple saccular glands may be branched or unbranched. A compound saccular gland consists of several lobules, each having many acini.

The acini of a lobule opens by short ductules into a common duct that discharge into the main duct of the glands. The oil glands in the human skin are simple, branched and saccular whereas, milk glands of humans are compound and saccular

39 **(a)**

Tendons connects muscles to bones

40 **(b)**

Leucocytes or white blood corpuscles are colourless blood cells. These are of two types on the basis of presence or absence of granules in cytoplasm :

Granulocytes : Granules are present in cytoplasm of granulocytes.

Name of granulocyte	Eosino -phils	Basop- hils	Neutr- ophils
Percentage (%)	1-5%	0.5 - 2.7 %	60 - 70%

Agranulocytes : Granules are absent in cytoplasm of Agranulocytes.

Name of Agranulocyte	Lympho -cytes	Monocytes
Percentage (%)	20 - 40%	2 - 7%

So, maximum numbers of leucocytes are neutrophils.

41 **(c)**

The mouthparts are movable articulated appendages around the mouth. They includes labrum (upper lips), a pair of mandibles, a pair of maxillae and a labrum (lower lip). A median flexible lobe acting as tongue lies with the cavity enclosed by mouthparts

42 **(b)**

Intercalated discs occurs between the cardiac muscle fibres of the heart

43 **(c)**

In cockroaches, a ring of 6-8 blind tubules called hepatic/gastric caecae is present, which secretes digestive juices

44 **(d)**

I – True, because hindlimb ends in five digits and they are larger and muscular than forelimbs that ends in four digits

II – True, because frogs are carnivorous. Due to this, alimentary canal is short and hence length of intestine is reduced

III – False, because on land, the buccal cavity, skin and the lungs act as respiratory organs

IV – False, heart of frog is three, chambered and it contains two atria and one ventricle

45 **(b)**

The inflammatory process begins with a chemical 'alarm' as a flood of inflammatory chemicals are released into the extra cellular fluid. Injured and stressed tissue cells, phagocytes, lymphocytes, mast cells and blood proteins are all sources of inflammatory mediators, the most important of which are **histamine, kinins, prostaglandins** and **complement.**

46 **(b)**

I- Proventriculus II-Gastric caecae III-Malpighian tubule.

Gizzard helps in grinding the food particles in cockroaches.

In the digestive system of cockroach, a ring of 6-8 blind tubules called gastric caecae is present at the junction of foregut and midgut, which secrete digestive juices

47 **(b)**

200 hexagonal ommatidia.

Ommtidia of cockroach is the visual unit. Each eye consists of about 2000 hexagonal ommatidia with the help of which, a cockroach can receives several images of an object

48 **(c)**

Digestion of the food takes place by the action of HCl and gastric juices secreted from the walls of stomach. Then the partially digested food is passed from stomach to the first part of intestine

49 **(c)**

In all connective tissues, except blood, the cells secretes fibres of structural proteins called collagen. These fibres provide strength, elasticity and flexibility to the tissue

50 **(a)**

Earthworm have long cylindrical body. The body is divided into 100-120 small parts called metamers

51 **(b)**

Frog contains thyroid gland liver, pancreas but salivary gland not found in frog's body. It is present in humans

52 **(b)**
Simple squamous epithelium is composed of plate-like or flat-disc like cells. The edges of these cells fit closely together just like the tiles in a floor. This is present at pericardial, perineural and peritoneal cavities, terminal bronchioles, air sacs, etc. In cavities of blood vessels and lymph vessels, it is called **endothelium**.

53 **(a)**
Ciliated epithelium lines the inside of the oviducts, ventricles of the brain, the spinal canal as well as the respiratory passages like trachea, bronchi and bronchioles.

54 **(c)**
The main function of the frog's skin is diffusion of the respiratory gases

55 **(d)**
All the above.
Animal tissues are broadly classified into four types; (i) Epithelial (ii) Connective (iii) Muscular and (iv) Neural

56 **(a)**
A-Setae, B-Female genital aperture, C-Male genital aperture, D-Genital papillae, E-Clitellum, F-Anus

57 **(a)**
A-Unicellular gland
B-Multicellular gland
C-Multilayered cells

58 **(c)**
Bile emulsifies the fats and pancreatic juices it does digests carbohydrates and proteins. Final digestion takes place in intestine. Inner wall of the intestine contains finger-like folds called microvilli, which absorbs digested food

59 **(c)**
In epithelial tissue, the adjacent cells form ion-rich gap or cell junctions for intercellular communication and chemical exchange. These junctions probably do not provide physical support.

60 **(c)**
The principal role of setae is in locomotion. They aids the earthworm in climbing out of the burrows

61 **(d)**
In addition to the Malpighian tubules, excretion of the waste product in cockroach also occurs by fat bodies. Nephrocytes and urecose glands

62 **(c)**
In earthworm, anus is the outlet for the faeces. As the anus is terminal, there is no tail in the earthworm

63 **(d)**
Each segment of the earthworm's body, except first, last and clitellum, bears a middle ring of small chitinous bristles, called setae. These setae are embedded in the epidermal pits in the middle of each segment and plays a major role in locomotion

64 **(d)**
Sense organs of the earthworm are very simple structures and located on the anterior part of the worm. Earthworms have specialised chemoreceptors (taste receptors). Which reacts to the chemical stimuli

65 **(c)**
Setae plays a principal role in the locomotion but not in defence against predators

66 **(a)**
Mature sperms, egg cells and nutritive fluid are deposited in cocoon, which are produced by the glands of clitellum. Fertilisation and development occur within the cocoon which are deposited in the soil

67 **(b)**
Fertilisation and development in the earthworms occurs with in the cocoon. In the cocoon, mature sperm, egg cells and nutritive fluid are deposited. The ova (eggs) are fertilised by the sperm cells within the cocoon which then slips off the worm and then gets deposited on the soil. These cocoons holds the worm embryo. After three weeks, each cocoon produces two to twenty baby worms with an average of four

68 **(b)**
Cardiac muscles are predominantly found in heart wall. These are striated involuntary contract quickly and do not get fatigued. These muscles continue rhythmic contraction throughout life under the control of ANS.

69 **(a)**
Stratified squamous epithelium is seen in the adult human body. It may be keratinized or non-keratinized. In keratinized stratified squamous

epithelium, the outer few layers contain a hard water proof protein in their cytoplasm.

70 **(d)**
Rh factor was discovered by **K Landsteiner** and **A S Wiener** (1940) from rabbits immunized with the blood of monkey *Macaca rhesus*. It is found is man and rhesus monkey only.

71 **(c)**
Earthworm lacks the specialised breathing devices and depends on cutaneous respiration (respiration through skin). Exchange of respiratory gases occurs through the body surface Moisture and humus makes the earth soft for burrowing

72 **(a)**
Frog respire on land and in water by the two different methods. In water, skin acts as aquatic respiratory organs. On land, inspite of skin, the buccal cavity and lungs acts as respiratory organs. Pulmonary respiration occurs on land through lungs

73 **(d)**
In all connective tissues, except blood, the cells secretes fibres of structural proteins called collagen. These fibres provide strength, elasticity and flexibility to the tissue

74 **(a)**
In male frogs, ureters acts as urinogenital duct because it carries urine as well as spermatozoa

75 **(b)**
The development of *Periplaneta americana* is paurometabolous, *i.e.*, there is development through nymphal stage. The nymphs looks very much like adults and grows by moulting about 13 times to reach the adult form

76 **(d)**
All of above statement are correct

77 **(c)**
Septal nephridia occurs on the posterior and anterior surfaces of all the septa behind the segment 15. They discharge waste matter into the intestine *via* septal excretory ducts and supra intestinal excretory duct. *i.e.*, enteronephric in nature

78 **(c)**
Compound epithelium is made of multilayered cells. Their main function is to provide protection against chemical and mechanical stresses. They covers the dry surface of skin, the moist surface of buccal cavity, the inner lining of ducts of, salivary glands and pancreatic ducts

79 **(c)**
There are two pairs of wings, a pair on mesothorax and a pair on metathorax. Prothorax do not contain wings

80 **(a)**
Earthworms lacks specialised breathing devices and depends upon cutaneous respiration. Exchange of respiratory gases occurs through the body surfaces

81 **(b)**
Numerous minutes pores called nephridiopores opens on the surface of the earthworm's body. They are scattered, occurs irregularly in all the segments, except the first two

82 **(b)**
The hormones in frogs acts as a chemical messenger which controls and coordinate the functioning of various organs of the body

83 **(c)**
Blood is a living, vascular, fluid connective tissue, which is made of 60% plasma, 40% blood cells and platelets.

84 **(b)**
The shape of RBCs varies in different vertebrate classes. In mammals, they are circular, biconcave and enucleated discs. Their central part is thinner than the margins. This shape provides flexibility and results in 20-30% increased surface area

85 **(b)**
Vitamin-K (phylloquinone) is the anti-haemorrhagic vitamin or factor, reported and named by a Danish scientist, **Dam** as **coagulation factor** (Danish term), who got the **Nobel Prize** for it in 1943. It is necessary for the **synthesis of prothrombin** (the precursor of thrombin) in the liver for normal clotting of blood. Thus, vitamin-K helps in blood clotting, prevention of haemorrhage and excessive bleeding in wounds.

86 **(b)**
Calcium ions plays an important role in blood clotting. Platelet thromboplastin and tissue thromboplastin combine to form prothrombinase in presence of Ca^{2+}. Then prothrombinase inactivates heparin and catalyzes the conversion of prothrombin into thrombin.

87 **(c)**
Four pair of spermathecae are located in 6th to 9th segments (one pair in each segments) of the

earthworm. They receives and store spermatazoa during copulation

88 **(a)**
Adipose tissue is a type of loose connective tissue located mainly beneath the skin. The cells of this tissue are specialised to store fats

89 **(c)**
Platelets are irregularly shaped membrane bound cell fragments. These are found only in the blood of **mammals**, they usually lack nuclei and are formed from special bone marrow. They are responsible for blood clotting. They survive for 5 to 9 days before being destroyed by the spleen and liver.

90 **(c)**
Fibroblasts, macrophages, mast cells, lymphocyte and plasma cells are cells of areolar tissue.

91 **(a)**
Petrohyal muscles raise the hyoid and floor of buccal cavity of frog during respiration.

92 **(c)**
Bones have hard and non-pliable ground substances, rich in calcium salts and collagen fibres which gives strength to bones

93 **(a)**
In frog, microvilli is present in the intestine and it helps in the absorption of digested food

94 **(a)**
Stratified squamous epithelium consists of two to many layers of cells. This type of epithelium lines the oral cavity, oesophagus and the vagina of mammals.

95 **(d)**
Scleroproteins are the proteins of supportive tissue and occur in hard parts of animal body. These are insoluble in water, absolute alcohol, dilute acid or alkali or other neutral solvents. Examples of scleroproteins are keratin, collagen, elastin, fibroin, chondrin, ossein, etc.

96 **(c)**
Glandular epithelium is mainly of two types
(i) **Unicellular** Consisting of isolated glandular cells, *i.e.*, in goblet cells of alimentary canal
(ii) **Multicellular** Consisting of clusters of cells, *i.e.*, salivary glands

97 **(b)**
A-Salivary glands, B-Crop, C-Gizzard, D-Malpighian tubules, E-lleium

98 **(a)**
Urinary bladder is bilobed in frogs

99 **(d)**
There are no teeth in the lower jaws of the frog and they usually swallow their food completely. Pedicellate teeths are present on upper jaw which is used to grip the prey and keep it in place till it swallowed

100 **(b)**
Pseudostratified epithelium consists of single layer of irregularly shaped columnar cells touching the basement membrane. Mucous secreting goblet cells are numerous and cilia are present. Pseudostratified columnar epithelium is found in lining of trachea and bronchi (both ciliated), parotid salivary gland, vasa deferentia and epididymis.

101 **(c)**
Each thoracic segment in cockroach is surrounded by four chitinous plate-a tergal plate, a sternal plate and two plurae. The tergal plate of the thorax are pronotum, mesonotum and metanotum. Pronotum is the largest tergal plate which covers the neck and a part of head

102 **(b)**
The columnar epithelium is composed of single layer of tall of slender cells. Their nuclei are located at the base and microvilli are present on free surfaces

103 **(d)**
A - Stratum germinativum, B - Sebaceous gland, C - Stratum lucidium, D - Sweat gland, E - Stratum corneum

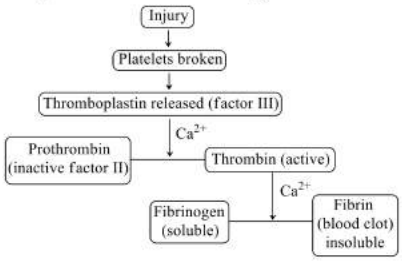
104 **(b)**
The **blood group-AB** is called universal recipient due to presence of both antigens (A and B) but no antibody, whereas blood group-O is called universal donor due to presence of no antigen but both antibodies (a and b).

105 **(c)**
Epithelial tissue lining of uriniferous tubules in the kidneys eliminates the nitrogenous waste and performs the function of excretion
Reproduction Germinal epithelium of the seminiferous tubules and ovaries produces spermetazoa and ova respectively
Absorption Epithelial lining of the intestine absorbs digested food
Secretion Epithelial lining the cavities gives rise to the glands that provide valuable secretions such as, mucous, gastric juice, etc.

106 **(c)**

Adipose tissue is fibrous connective tissue packed with masses of fat cells. These form a thick layer under the skin and occurs around kidneys. The blubber is also formed by these tissues.

107 **(b)**
Steps of blood clotting are



108 **(a)**
A frog heart is solid muscular organ situated in the upper half of body cavity. It is three chambered with two auricles and one ventricle. The ventricle is incompletely divided by an interventricular spetum, while auricles are completely divided by interauricular spetum. Heart is covered by a membrane called pericardium. The potential space between heart and pericardium is called pericardial space. This space is fluid filled and the fluid here is called pericardial fluid. The heart of frog pumps mixed blood as lungs are not much functional is than and most of the oxygenation of blood takes place throngle skin

109 **(a)**
The dorsal surface of the body is marked by a dark median mid dorsal line, *i.e.*, dorsal blood vessels along the longitudinal axis of the body

110 **(b)**
Erythropoiesis is the formation of RBC_S in blood. It starts in liver in the embryo and in the red bone marrow of adults.

111 **(d)**
Neutrophils and monocytes are phagocytic white blood cells.

112 **(c)**
An adult earthworm develops a belt like swelling called cingulum or clitellum, which covers the several segments towards the front part of the animal. This is a part of reproductive system that creates egg capsules (cocoons)

113 **(d)**
Tendons and **ligaments** are the dense, fibrous connective tissues. Tendon connects a skeletal muscle to a bone, while ligaments connect bones together.

114 **(d)**
Collagen is the major fibrous structural protein of connective tissue occurring as while fibres produced by fibroblasts. It provides high tensile strength. Collagen fibres are composed of masses of tropocollagen molecules, each a triple helix of collagen monomers.

115 **(b)**
Anterior end of earthworm's body consists of mouth and prostomium. The first body segment is called the peristomium (buccal segment) which contains the mouth

116 **(a)**
Clotting of collected blood can be prevented by coating the test tubes with silicon or adding chelating agents. Heparin is an anticoagulant and is not suitable for blood counts as it alters the shape of RBC_S and WBC_S, which affects blood testing.

117 **(c)**
Signet ring appearance is obtained with tissue preparation of adipose tissue. The thin peripheral ring of cytoplasm and the flattened peripheral nucleus, coupled with the large central vacuole result in the signet ring appearance of fat cells.

118 **(a)**
In multicellular organisms, a group of similar cells along with intercellular substances performs a specific functions. Such organisation is called tissue

119 **(b)**
The alimentary canal of forg is short because they are carnivores and hence the length of the intestine is reduced

120 **(a)**
Frog exhibits sexual dimorphism. The sexes are separate and distinguishable externally

121 **(a)**
Cells are compactly packed with little intercellular matrix

122 **(d)**
The common Indian earthworm are *Pheretima* and *Lumbricus*

123 **(b)**
The vascular system of the frog is well-developed and of closed type. The blood vascular system involves heart, blood vessels and blood. Frogs have the lymphatic system also

124 **(c)**

Endocrine glands do not have ducts and hormones are the product of this gland, which are secreted directly into the fluid bathing the gland

125 **(c)**
The circulatory system of the cockroach is of open type. Visceral organs lie in the haemocoel immersed in the blood called haemolymph. Heart of the cockroach is 13 chambered not 6 chambered

126 **(d)**
Simple cuboidal epithelium is made up of a single layer of cube-like cells. This is mainly found in ducts of glands and its main functions are secretion and absorption

127 **(a)**
Liver is the largest gland of frog's body, which secretes bile that is stored in the gall bladder. The bile emulsifies fats, changes pH of food from acidic to alkaline and check the growth of bacteria

128 **(b)**
Tendons are white fibrous connective tissue, which connect muscle to bone.
Ligaments are yellow fibrous connective tissue, which connect one bone to another bone.

129 **(d)**
All of the given statements are correct. None of them are incorrect

130 **(b)**
Anatomy is concerned with the study of internal structures of an organism as revealed by dissection
(G. *ana* = up, *tome* = to cut)

131 **(d)**
Animal tissues are broadly classified into four types; (i) Epithelial (ii) Connective (iii) Muscular and (iv) Neural

132 **(a)**
The columnar epithelium is composed of single layer of tall and slender cells, microvilli is present on free surfaces. They are found in the lining of stomach and intestine and helps in secretion and absorption

133 **(c)**
The food of the earthworm is decaying leaves and organic matter mixed with the soil

134 **(c)**
The body cavity of earthworm is the true coelom, being lined by coelomic epithelium. The coelom contains coelomic fluid secreted by the coelomic epithelium. The coelomic fluid oozes out *via* dorsal pores to keep the skin moist which helps in respiration

135 **(a)**
Frog contains three-chambered heart, in which two atria and one ventricle is present. The blood from the heart is carried to all parts of the body by arteries (arterial system). The veins collects blood from the different parts of the body to the heart and forns the venous system

136 **(a)**
The red blood corpuscles are the most numerous elements found in the blood. They are the most abundant cells in the human body. RBCs contains oxygen-carrying pigment (haemoglobin) in their cytoplasm

137 **(a)**
10th-11th.
Earthworm contains two pairs of testes in the segment 10th and 11th

138 **(c)**
Monocytes are the largest white cells of blood having ramiform or horse shoe shaped nucleus. These are actively motile and phagocytic cells. These cells after entering into tissue fluid, transform into macrophages.

139 **(c)**
A-Prostomium, B-Metameres, C-Clitellum, D-Anus

140 **(c)**
Blood vascular system of the earthworm is of closed type, consisting of blood vessels, capillaries and heart. Blood glands are present on the 4th, 5th and 6th segments

141 **(b)**
Malpighian tubules are present at the junction of midgut and hindgut and helps in the removal of excretory products from haemolymph

142 **(a)**
Blood of cockroach contains colourless plasma and leucocytes

143 **(d)**
Basophils are non-phagocytic in nature. There number increases in chicken pox. These represent mast cells of connective tissue.

144 **(a)**
The mature bone generally has two types of parts-compact (dense and solid) or periosteal bone and spongy bone. The spongy bone (cancelous or tubercular bone) consists of bony bars. The red bone marrow, is the most radio-sensitive tissue of the body.

145 **(a)**
Squamous epithelium is present on absorptive and secretary surfaces. They are found in the walls of blood vessels and air sacs of lungs, where it is involved in the formation of diffusion boundary

146 **(d)**
Cells are compactly packed with inter cellular spaces to form epithelial. The connective tissue secretes fibres of structural protein called collagen. Neuroglea is made up to more than one half the volume of neural tissue in human body

147 **(b)**
The structure of the cells vary according to their function. Therefore, the tissues are different and broadly classified into four types, *i.e.*, epithelial, connective, muscular and neural

148 **(b)**
Hind limbs of frog have five fingers

149 **(a)**
As earthworm lives after forming in soil hence soil erosion is harmful for earthworm

150 **(c)**
Spleen in mammals acts as haemopoietic tissue because synthesis of WBC_S takes place in spleen lymphocytes, For the destruction and recycling of old red blood cells. The spleen is also a blood reservoir.

151 **(a)**
Body of the cockroach is covered by hard chitinous exoskeleton. Exoskeleton has hardened plates called sclerites, which are joined to each other by a thin and flexible articular membrane. These sclerites are formed of chitin which is a polysaccharide of acetylglucosamine molecules

152 **(a)**
In the line with male genital pores, the 17th-19th segments bear a pair of papillae each. These are called copulatory papillae. Each papilla has shallow, cup like pit and bears fine aperture of accessory glands

153 **(c)**
In male reproductive system of frog, vasa efferentia are 10-12 in numbers arises from testes. They enter the kidney on their sides and opens into the Bidder's canal

154 **(a)**
In human body 98.5% of O_2 is transported by the respiratory pigment haemoglobin which is present in erythrocyte of blood. One molecule of haemoglobin can carry four molecules of O_2

155 **(c)**
A-RBCs; B-WBCs; C-Platelets

156 **(a)**
In excretory system of the earthworm, integumentary nephridia, is attached to the lining of the body wall of segment 3 to the last that opens on the body surface. They discharge body waste to the exterior by nephridiopores

157 **(d)**
Nerve cells is unit of nervous tissue. It is specialized for communication between various parts of the body and in integration of their activities.

158 **(d)**
Neuroglia consists of supporting and packing cells found in the brain, spinal cord and ganglia. These cells have different shapes and bears many processes

159 **(d)**
Basophils are granule containing leucocytes. They release heparin, histamine and serotonin. They are probably like mast cells of connective tissue. Monocytes and neutrophils are phagocytic in nature, while lymphocytes and eosinophils play a role in immune system.

160 **(c)**
The striated or striped or skeletal or voluntary muscles are in the form of bundles of individual muscle fibres. These bundles are called fascicule. These fasciculi are covered by three coverings of connective tissue. These coverings are epimysium (outermost covering), perimysium (middle covering) and endomysium (innermost covering).

161 **(d)**
When a neuron is suitably stimulated, an electrical disturbance is generated which travels along its plasma membrane. Arrival of the disturbance at the neuron's ending, triggers the events that may cause the stimulation of adjacent neurons and other cells

162 **(c)**
The abdomen in both males and females cockroaches consists of 10 segments

163 **(d)**
Lymphocyte is a type of agranular leucocyte formed by lymph gland and lymph node.

Mast cells are cells of connective tissue, modified from basophil of blood and secrete histamine, serotonin and heparin.
Plasma cells are cells of connective tissue, which synthesize antibodies.

164 **(d)**
The dense connective tissue is elastic and contains abundant yellow elastin fibres. 'Provide toughness and strength' is not characteristic of yellow fibres of connective tissue.

165 **(a)**
A single female genital pore is present in the mid-ventral line of 14th segment of human

166 **(a)**
A-Collagen, B-Chondrocyte

167 **(c)**
Ciliated epithelium consists of the cells that bears cilia on their free surface. Their function is to move the particles or mucous over the epithelium in a specific direction. They are mainly found in the inner surface of the hollow organs like bronchioles and Fallopian tubes

168 **(d)**
Process of formation of blood clot is also known as blood coagulation. This process can be described under four major stages.

1. Damaged platelets or tissue cells release thromboplastin.
2. $\text{Prothrombin} \xrightarrow{Ca^{2+}\downarrow} \text{Thrombin}$
3. $\text{Fibrinogen} \xrightarrow{Ca^{2+}} \text{Fibrin}$
4. $\text{Fibrin} + \text{cells} \rightarrow \text{Clot}$

Thrombocytes help in blood coagulation.

169 **(a)**
The entire body of a cockroach is covered by hard chitinous exoskeleton or cuticle, which is brown in colour. Main function of the exoskeleton is to prevent the loss of water from the body

170 **(a)**
Cardiac muscle tissue is a contractile tissue present only in the heart

171 **(a)**
The skin of frog is naked (*i.e.*, without scales or feathers), smooth and slippery due to presence of sac-like mucous gland that discharge slimy mucous onto the surface by ducts passing through the epidermis

172 **(a)**
The frog is a cold-blooded animal, *i.e.*, its body temperature changes with the temperature of the surrounding environment (Poikilothermic). In winters the body temperature of frog falls considerably.
This make it inactive and may result in death. To avoid this, during this period it does not show any movement and respires through the skin. In hot summers, also it burries itself in the mud at the bottom of pond and respire through skin. When water recollects in the pond the frog again becomes active. The winter activity is called hibernation while summer activity is called estivaion

173 **(d)**
Each body segment, except the first, last and clitellum, bears in it a middle ring of small chitinous bristles called setae. It helps in locomotion

174 **(d)**
Tendons are modified white fibrous tissue, in which, white fibres occurs in thick parallel bundles. They connect muscle to bone, *e.g.,* Achilles tendon. It is the strongest and thickest tendon in the body and connects gastrocnemius (calf) muscle to bones.

175 **(c)**
A-Anterior aorta or dorsal blood vessel or heart
B-Alary muscles
C-Chambers of heart

176 **(c)**
Earthworm shows adaptations mainly for burrowing and survival. It has an ability to push its way through the soft soil and to eat its way through the hard soil. Thus ensures its efficiency under both type of soil conditions

177 **(b)**
Endocrine glands.
Endocrine glands do not have ducts and hormones are the product of this gland, which are secreted directly into the fluid bathing the gland

178 **(b)**
They receives and store spermatozoa during copulation.
Four pair of spermathecae are located in 6th to 9th segments (one pair in each segments) of the earthworm. They receives and store spermatazoa during copulation

179 **(b)**

In the exoskeleton of the cockroach, sclerites are joined to each other by arthrodial membranes to allow movements

180 **(b)**
Skeletal muscles are voluntary in their action, *i.e.*, we can move them according to our will walls of the blood vessels contains epithelial tissue not skeletal muscles

181 **(d)**
In the digestive system of cockroach, a ring of 6-8 blind tubules called gastric caecae is present at the junction of foregut and midgut, which secrete digestive juices

182 **(b)**
Adipose (connective) tissue - Storage of fats.
Areolar connective tissue - Joins integument with muscles.
Tendons - Connect skeletal muscle with bone.
Ligaments - Connect bone to bone

183 **(a)**
Emulsification of fats.
Liver is the largest gland of frog's body, which secretes bile that is stored in the gall bladder. The bile emulsifies fats, changes pH of food from acidic to alkaline and check the growth of bacteria

184 **(a)**
In mammals, RBC_S are roughly circular, biconcave, disc like, non-nucleated corpuscles. In human, the RBC_S are 6.5 μ to 8 μ in diameter (average diameter 7.2 μ) and $1 - 2$ μ thick.

185 **(c)**
A-Dorsal vessel, B-Commissural vessel, C-Sub neural vessel, D-Ventral vessel

186 **(b)**
Loose connective tissue contains fibroblasts (cells that produce and secrete fibres), macrophages (phagocytic in nature) and mast cells (which secretes heparin, serotonin and histamine).

187 **(a)**
The female reproductive system of cockroach consists of two large ovaries, which are present laterally in the 2nd-6th abdominal segments

189 **(d)**
Pharyngeal nephridia in earthworm are present as three paired tufts in the segments 4 to 6. They discharge excretory matter into the gut by these paired ducts. Therefore, they are called as enteronephric nephridia. Septal nephridia also open into alimentary canal

190 **(d)**
The nymphs grows by moulting about 13 times to reach the adult forms

191 **(c)**
The respiratory system of the cockroach comprises a network of white, shining tubes called trachea, that opens out by 10 pairs of small holes called spiracles which are present on the lateral sides of the body

192 **(d)**
Body of frog is divisible into head and trunks. Neck and tail are absent in frog

193 **(c)**
Mast cells of connective tissues continuously release in blood plasma, a conjugated polysaccharide, named heparin. The later serves to prevent coagulation of blood, white it is flowing in intact blood vessels.

194 **(b)**
Pheretima exhibits closed type of vascular system, consisting of blood vessels, capillaries and heart. Due to the closed circulatory system, blood is confined to the heart and blood vessels

195 **(b)**
Osteoblasts cells helps in the formation of bones and are present in the spaces called lecunae

196 **(a)**
The cockroaches are omnivorous in diet. They take all the types of animals and vegetable foods

197 **(a)**
Epithelial tissue has free surfaces, which faces either a body fluid or the outside environment and thus, provides a covering or a lining for some part of body. It is found on a lining of small intestine and helps in secretion and absorption

198 **(d)**
Both white and red muscle fibres have **myoglobin**. Myoglobin contains heme group which is responsible for carrying of oxygen molecules to muscle tissues.

199 **(c)**
Plasma cells of connective tissue produce antibodies.
Mast cells are modified basophil cells of blood and present in connective tissue. These cells secrete histamine (vasodilator), serotonin (vasoconstrictor), heparin (anticoagulant). White and yellow fibres are present in matrix of

connective tissue. White fibres are present in matrix of connective tissue. White fibres are made up of collagen protein and yellow fibres are made up of elastin protein.

200 **(a)**
In the head region of cockroach, brain is represented by supra-oesophageal ganglion, which supplies the nerves to antennae and compound eyes

201 **(a)**
The elimination of nitrogenous wastes in frog is carried out by a well-developed excretory system. The excretory system consists of a pair of kidneys, ureters, cloaca and urinary bladder. Each kidney is composed of structural and functional unit called nephrons or uriniferous tubules

202 **(c)**
Squamous epithelium is found on the walls of lungs not on the walls of kidneys

203 **(b)**
Four pairs of spermathecal apertures are situated on the ventro-lateral sides of the intersegmental grooves, *i.e.*, 5th to 9th segments, *i.e.*, 5/6, 6/7, 7/8 and 8/9 segment. They leads into spermathecae and serves to receive the sperms from another worms during copulation

204 **(d)**
The skin of the frog is naked (without scales), smooth and slippery. It consists of two regions- epidermis and dermis. Dermis contains sac-like mucous glands that discharges slimy mucous

205 **(d)**
Epithelium cells of the intestine involved in food absorption have microvilli on their surface to increase surface area for food absorption.

206 **(d)**
In frog, heart is a muscular structure situated in the upper part of the body cavity. It has three chambers, two atria and one ventricle. As ventricle is incompletely divided hence mixing of oxygenated and deoxygenated blood is visible in this heart. That's why it is also called mixed circuit heart

207 **(d)**
Earthworm's intestine starts from the 15th segment and continues till the last segment. A pair of short conical intestinal caecae projects from the intestine on the 26th segment

208 **(d)**
Columnar epithelium is found in the lining of stomach and intestine where it helps in the secretion and absorption of nutrients. Kidneys contains single layer of cube-like cells called cuboidal epithelium

209 **(b)**
A-Spermathecae, B-Testes, C-Seminal vesicles, D-Ovary, E-Ovarian funnel, F-Accessory gland, G-Prostate gland

210 **(c)**
A-Vasa efferentia; B-Testis; C-Adrenal gland; D-Fat bodies; E-Kidney

211 **(c)**
In frog, cloaca is a single opening of both excretory and reproductive ducts. The undigested solid waste moves into the rectum and passes out through cloaca

212 **(c)**
A small spherical gall bladder lies between the two main lobes of the liver. It stores bile secreted by the liver before releasing into the duodenum

213 **(b)**
B-Seminal vesicles

214 **(d)**
The thorax of a cockroach forms the middle part of the body. It consists of three segments the anterior prothorax, middle mesothorax, last metathorax

215 **(b)**
Lymphocyte is not phagocytic in nature. They produce antibodies as they are the key cells of immune system.

216 **(a)**
A-Dendrites; B-Cyton; C-Axon

217 **(a)**
Alimentary canal

218 **(b)**
Thin Malpighian tubules in cockroaches are present at the junction of mid gut and hind gut. These tubules have excretory role

219 **(a)**
Blood vascular system of the cockroach is of open type. Blood vessels are poorly developed and opens into the haemocoel

220 **(c)**
The type of epithelial cells that line the inner surface of fallopian tubes, bronchioles and small bronchi, are known as **ciliated epithelium.**

221 **(b)**
White blood cells (leucocytes) are of two types :

5. **Granulocyte** : This types of WBC, have granules in cytoplasm. These are eosinophils, basophils and neutrophils.

6. **Agranulocytes** : This types of WBC, does not have granules in cytoplasm, *e.g.*, lymphocytes and monocytes.

222 **(c)**
Smooth muscles are called smooth, plain, non-striated involuntary or unstriped muscles due to absence of striations. These nuscles occur in the wall of hollow internal organs (alimentary canal, gall bladder, bile ducts, etc.); in capsules of lymph glands, spleen etc; in iris and ciliary body of eyes etc. there is no connection of these muscles with bones.

223 **(b)**
Spleen or blood bank is the largest mass of lymphoid tissue present on the left side against the stomach of jawed vertebrates. It acts as the reservoir of important lymphocytes and plasma cell reservoir and as a store house of RBC_S

225 **(c)**
A pair of male genital pores are present on the ventro-lateral sides of the 18th segment. They serves for the exit of the sperms

226 **(a)**
In cockroach, fertilised eggs are stored in the dark reddish to blackish brown capsule, (about $3/8^{II}$ (8 mm long) called oothecae. On an average, females produces 9-10 oothecae, each containing 14-16 eggs

227 **(a)**
Excretory system of a frog consists of a pair of kidneys, ureters, urinary bladder and cloaca

228 **(c)**
Monocyte is the largest WBC, which involves in phagocytosis of pathogen like bacteria.

229 **(c)**
Gizzard is a muscular oval sac in segment 8-9 of the earthworm. It helps in grinding the soil particles and decaying leaves which earthworm eats

230 **(c)**
Connective tissues are classified into three types loose connective tissue, dense connective tissue and specialised connective tissue

231 **(d)**
All the statements are correct

232 **(c)**
In females, the 7th sternum is boat-shaped and together with 8th and 9th sterna it forms a genital pouch whose anterior part contains it female gonopore, spermathecal pores and collateral glands

233 **(d)**
Loose connective tissue, also called areolar connective tissue, is the 'packing material' of the body that anchors blood vessels, nerves and body organs. It contains fibroblasts that synthesize the fibres and ground substance of connective tissue and wandering macrophages that phagocytize pathogens or damaged cells. The different fibres types include strong collagen fibres and thin elastic fibres formed of the protein elastin.

234 **(b)**
Earthworm is ureotelic animal. Their excretory matter is mainly urea. Their discharge of waste matter *via* gut is an adaptation to conserve water by its reabsorption in the gut

235 **(a)**
Ommatidia of cockroach is the visual unit. Each eye consists of about 2000 hexagonal ommatidia with the help of which, a cockroach can receives several images of an object

236 **(c)**
Integumentary nephridia are attached to the inner surface of the body wall in all the segments except the first two. They discharge waste matter to the exterior by nephridiopores. Therefore, they are responsible for the exonephric excretion

237 **(b)**
Morphology refers to the study of externally visible features, *i.e.*, shape, size, colour, symmetry

238 **(c)**
The midbrain of the frog is characterised by a pair of optic lobes in it

239 **(b)**
Earthworm is also known as 'friends of farmers' because they make burrows in the soil and make it porous which helps in the respiration and penetration of developing plant roots. The process of increasing fertility of the soil by earthworm is called vermicomposting

240 **(c)**
The skin of frog is smooth and slippery due to the presence of mucous not of gelatinous sheath

241 **(c)**

A-Duct of pharyngeal nephridia, B-Tufts of pharyngeal nephridia, C-Integumentary nephridia, D-Forest of integumentary nephridia, E-Septal nephridia, F-Blood glands

242 **(d)**
Haversian canal is one of many channels formed within bone by the development of osteoblasts in concentric rings around them and whose function is to facilitate the linking of the living parts. Each canal may contain an artery, a vein and a nerve and the canals ramify throughout the bone communicating with the bone marrow and the periosteum.

243 **(a)**
The columnar epithelium is composed of a single layer of tall and slender cells. If the columnar cells bear cilia on their free surface they are called ciliated columnar epithelium. They are mainly present in the inner surface of hollow organs like bronchioles, oviduct and fallopian tubes. Their function is to move particles or mucus in a specific direction over the epithelium.

244 **(a)**
Unstriped muscles are also known as non-striated, visceral, smooth or involuntary muscles. Muscle fibres of smooth muscle are uninucleated and spindle-shaped, *e.g.,* **muscles of pupil of eye, uterus,** etc.

245 **(c)**
In the respiratory system of cockroaches, trachea opens through 10 pairs of small holes called spiracles. The part of integument, which, support the spiracle from outside is called peritreme

246 **(a)**
The microscopic study of the tissues and organs in relation to their functions is known as histology. It is also called as microscopic anatomy or microanatomy

247 **(c)**
Blood cells of earthworm are phagocytotic in nature

248 **(c)**
Gametes in animas are derived from the germinal epithelial tissues. Epithelial tissues covers the whole body surfaces and lines the body cavities

249 **(a)**
Erythrocytes (red blood corpuscles) of mammals (man) are round, biconcave and non-nucleated. Life span of mammalian RBC_S is about 120 days (4 months).

250 **(d)**
The cockroaches are placed in Phylum-Arthropoda because they have joined appendages and haemocoel

251 **(d)**
Heparin is an anticoagulant and prevent blood coagulation.

252 **(a)**
A-Macrophages
B-Fibroblasts
C-Collagen fibres

253 **(a)**
Exchange of the gases in cockroaches takes place in tracheoles by the process of diffusion. Terminal parts of the tracheoles contains fluid that facilitate the exchange of O_2 and CO_2 by diffusion

254 **(b)**
The colour of the ventral side of the skin of frog is pale yellow

255 **(c)**
Oenocytes cells are wax secreting cells in cockroach

256 **(a)**
Minimum regeneration power is present in nervous tissue. Centrosomes which help in cell division, are absent in nerve cell and these are highly differentiated cells. So, power of division is absent in nerve cells.

257 **(a)**
14-16 fertilised eggs are present in oothecae of cockroach

258 **(c)**
Genital pouch.
In females, the 7th sternum is boat-shaped and together with 8th and 9th sterna it forms a genital pouch whose anterior part contains it female gonopore, spermathecal pores and collateral glands

259 **(b)**
A-Cuboidal, B-Squamous, C-Ciliated columnar

260 **(c)**
No eyes.
Sensory system of the earthworm do not possess eyes but it possess light and touch sensitive organs (receptor cells) to differentiate between the light intensities and to feel the vibrations in the ground. These sense organs are located on the anterior part of the worm

261 **(c)**

Debove's membrane is a layer present between the epithelium and basement tissue of respiratory and intestinal epithelium. This is formed by connective tissue.

262 **(a)**
Ciliated columnar epithelium comprises columnar cells, which have cilia on the free surface. This epithelium lines most of the respiratory tract and fallopian tube (oviducts). It also lines the ventricles of the brain and the central canal of the spinal cord. It is also present in tympanic cavity of middle ear and auditory tube.

263 **(b)**
RBC_S of mammals are round, biconcave and without nucleus, mitochondria, Golgi body, centrosomes etc. These cell organelles lose during development (reticulocyte stage).

264 **(a)**
The process of formation of blood corpuscles is called **haemopoiesis** or **haematopoiesis**. During embryonic and foetal life, blood cells are formed in yolk sac, liver, spleen, thymus gland, lymph nodes and bone marrow. In adults, red bone marrow is responsible for producing red blood cells, granular leucocytes and platelets.

265 **(b)**
Lining of intestine and kidney in human is formed by columnar epithelium, which has cells with microvilli on free surface and forms brush border. Brush bordered surface increases the absorptive area of the surface.

266 **(a)**
In male cockroach, genital pouch contains dorsal anus, ventral genital pore and gonapophysis

267 **(a)**
The frog is a ureotelic animal because it excretes urea. Excretory wastes are carried by blood into the kidney where it is separated and excreted

268 **(d)**
The alimentary canal is a straight tube and runs between the first to last segments of the body of earthworms

269 **(b)**
In the male reproductive system of cockroach, a pair of spermatheca is present in the 6th segments which opens into the genital chambers

270 **(c)**
Frog has three eyelid membranes, one is transparent to protect the eyes under water and the two varies from translucent to opaque. Each eyes has closable upper and lower lids and a nictitating membrane, which provides further protection

271 **(d)**
The frogs only breeds in rainy seasons

272 **(b)**
In cockroach, spermatozoa are stored in the seminal vesicles and are glued together in the form of bundles called spermatophores, which are discharged during copulation

273 **(c)**
In earthworms, nephridia regulates the volume and the composition of body fluids. A nephridium begins as a funnel that collects excess fluid from the **coelomic chamber**. This funnel connects with the tubular part of the nephridium, which delivers the wastes through a pore to the surface in the body wall into the digestive tube

274 **(c)**
C-Malpighian tubules

275 **(d)**
The main role of calciferous glands, present in stomach is to neutralise the humic acid present in humus

276 **(c)**
A - Chondrin, B - Chondrocyte, C - Lacuna, D - Capsular matrix,
E - Perichondrium.

277 **(a)**
Each organ of human body is made up of more than one type of tissue, *i.e.,* epithelial, connective, muscular and neural

278 **(d)**
Tendon is a modified white fibrous tissue, in which white fibres occur in thick parallel bundles. Tendon cells are found in rows. Tendon usually connects muscle to bone and is capable of withstanding tension.

279 **(a)**
Muscle fibres are composed of numerous fine fibrils called myofibrils. Muscles plays an important role in the movement of the body

280 **(b)**
Actinomyosin complex is formed when actin and myosin proteins are combined in the presence of ATP and Ca^{2+}ions and when these ions removed, the actin and myosin dissociate. This process takes place during muscle contraction.

281 **(b)**

Our heart consists of four types of tissues, *i.e.*, epithelial connective, muscular and neural

282 **(a)**
In frogs, teeths are absent on the lower jaw

283 **(c)**
Spleen is known as the graveyard of RBC_S, as its cells are phagocytosise worn red blood cells and platelets.

284 **(c)**
A-Collaterial glands, B-Genital chamber, C-Vestibulum, D-Spermatheca, E-Gonapophyses

285 **(a)**
Matrix is not a product of synthesis of its cells in muscular tissue. It is the fibroblast cells of connective tissue which form fibres and matrix both.

286 **(d)**
In the structure of compound squamous epithelium, several layers of cells, deep layers are Cuboidal to columnar, surface layers flat and scale-like. This epithelium is found in mouth, oesophagus, part of epiglottis (pharynx) and vagina. The main function of this epithelium is protection.

287 **(a)**
In *Pheretima*, cocoons are formed in 14th, 15th and 16th segments. Fertilisation of ova (egg) by the sperm cells occurs within the cocoon, which then slip off the worm and deposited in the soil. These cocoons holds the worm embryos

288 **(d)**
Crop is a sac-like structure in the digestive system of cockroach and used for storing the food and not for grinding the food

289 **(b)**
The worm feeds on soil. The organic particles of the soil are used up and the undigested matter along with soil is passed out a small pills, called 'worm castings'

290 **(a)**
In the female reproductive system of cockroach, ovaries are located in the 2nd-6th abdominal segments

291 **(b)**
An infection or tissue injury usually causes redness, swelling, pain and production of heat that may result in fever. Such an expression is called **inflammation**. Neutrophils are most abundant, phagocytic WBC_S. Their number increases during inflammation.

292 **(a)**
Blood platelets are non-nucleated (nucleus absent), that's why they are not true cells.

293 **(b)**
Neutrophil, monocytes and macrophages are types of white blood cells. The granular white blood cells neutrophils, eosinophils and agranular leucocytes including monocytes and tissue macrophages are phagocytic in nature.
Basophils are non-phagocytic and involved in allergic reactions.

294 **(c)**
Hyaline cartilage is most abundant kind of cartilage with **no fibres** and transparent matrix. It is the initial skeleton of foetus. In adults it is found in bronchi, larynx, at the end of ribs etc.

295 **(c)**
The gap junction and interdigitation are considered as communicating junctions. These junctions permit the controlled passage of small molecules or ions between cells. In animals, direct communicating channels are gap junctions, which in plants are called plasmodesmata.

296 **(d)**
Juvenile hormones in insects refers to a group of hormones, which ensures the growth of larvae, while preventing metamorphosis.
Because of their rigid exoskeleton, insects grow in their development by successively sheding their exoskeleton.
These hormones are secreted by a pair of endocrine glands behind the brain, called corpora allata

297 **(d)**
Bone marrow is a special spongy fatty tissue that houses stem cells, located inside a few large bones. It is made up of fatty acid, areolar tissue and blood vessel.

298 **(d)**
Cockroaches are unisexual animal. Sexes are separate and distinguishable externally (sexual dimorphism)

299 **(a)**
During blood clotting, prothrombin is converted into thrombin with the help of thrombokinase and calcium ions. Heparin is an anticoagulant, which prevents the conversion of prothrombin into thrombin.

300 **(d)**

Mast cells, found in matrix of connective tissue produces heparin and histamine. Monocyte is the largest leucocyte with rounded nucleus and they are the direct precursor of macrophages.

301 **(d)**
All the limbs of frog are helpful in swimming, walking and leaping

302 **(d)**
In male frog, cloaca is a small median chamber that is used to pass sperms, faecal matter and urine

303 **(b)**
Phylum – Chordata
Sub-phylum – Craniata
Section – Gnathostomata
Class – Amphibia
Genus - *Rana*

304 **(d)**
Collagen fibres are most abundant in tendons. These are secreted by **fibroblast** cells.

305 **(b)**
The keratinised stratified squamous epithelium forms the epidermis of the skin in land vertebrates. Its horny layer prevents the loss of water and mechanical injury

306 **(c)**
The cells of adipose tissue are specialised to store fats. The excess of nutrients which are not used immediately by the body are converted into fats and get stored in this tissue

307 **(d)**
Columnar epithelium is found in the lining of stomach and intestine and helps in the secretion and absorption of nutrients

308 **(c)**
The myelin sheath appears as a tube around the axon. It is filled with the complex mixture of lipids and proteins called **myelin**, due to which, the myelinated nerve fibres appear white in colour.

309 **(d)**
Nails, hoofs and horns are examples of epidermal derivatives. Claws are modified into nails, which are characteristic of mammals. Hoofs are characteristic of ungulates. Horns are found in hoofed mammals (Artiodactyla and Perissodactyla) only. All the three (*i.e.*, nails, hoofs and horns) are modification of stratum corneum.

310 **(a)**
Heart of the cockroach is elongated muscular tube lying along the mid dorsal line of the thorax and abdomen

311 **(b)**
White fibrous cartilage contains more collagen fibres and lack perichondrium. It is the strongest cartilage in vertebrate body and is required where great tensile strength, flexibility and rigidity is needed. It is found in intervertebral disc and public symphysis of pelvic girdle.

312 **(c)**
Cockroaches are omnivorous animals

313 **(b)**
Hypochromic microcytic anaemia (fewer and smaller erythrocytes with reduced haemoglobin) and leucopenia (low value of leucocytes in blood) are caused by the deficiency of pyridoxine and folacin respectively.

314 **(d)**
Carotene is found in stratum corneum of epidermis and cells of sub-epidermal adipose tissue.

315 **(b)**
Typhosole is present as internal median folds on the dorsal wall of the small intestine between 26-35 segments. These folds increases the effective area of absorption in the intestine

316 **(c)**
Peyer's patches are found in ileum and made up of lymph nodes. These are aggregates of lymphocytes, where B-cells from a central follicle and are surrounded by T-cells and macrophages, which help the T-cells to recognize antigen. Mucosa associated lymphoid tissue (MALT) is made up of Peyer's patches.

317 **(b)**
The body of *Periplaneta americana* is segmented and divisible into three distinct regions head, thorax and abdomen

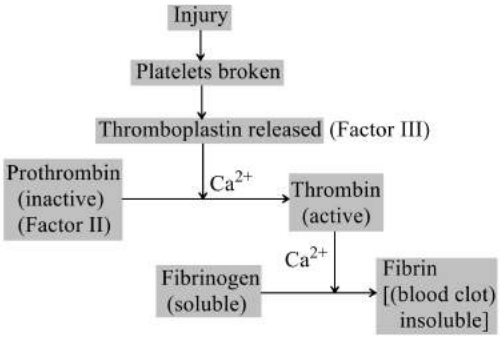
318 **(c)**
The mouthparts of a cockroach are said to be of biting and chewing type because they are used for masticating the food

319 **(a)**
Tibia is slender but the longest part of the leg of cockroach. It bears stout spines called tibial spurs

320 **(b)**
In earthworm's nerve cord is paired, solid and ventral

321 **(b)**

Steps of blood clotting are



322 **(a)**
In animals, gametes are derived from germinal epithelial tissue. Epithelial tissue covers whole body surface or tissues, lines body cavities and form glands.

323 **(c)**
Long bones have a narrow cavity at their centre. These narrow cavities contains bone marrow. Bone marrow is a soft, fatty tissue. It is of two types red and yellow. The red bone marrow is composed of highly vascular, very loose reticular tissue. It produces red corpuscles and granular white corpuscles

324 **(d)**
Cartilage is a solid but semi-rigid and flexible, connective tissue. The outer covering of cartilage is called Perichondrium (a sheath of collagen fibre).

325 **(d)**
All of these

326 **(b)**
A-Skeletal; B-Smooth; C-Cardiac;

327 **(c)**
The alimentary canal of earthworm opens to the exterior by a small rounded aperture called anus

328 **(a)**
The squamous epithelium is made of a single thin layer of flattened cells with irregular boundaries. They are found in the walls of blood vessels and air sacs of lungs and are involved in functions like forming a diffusion boundary.

329 **(b)**
A-Testis, B-Phallic gland, C-Anal cerci, D-Caudal style, E-Pseudopenis, F-Titillator

330 **(c)**
Earthworm is a bisexual animal (hermaphrodite), *i.e.*, testes and ovaries are present in the same individual

331 **(d)**
There are 300 millions of alveoli (also called acini) in two lungs. The alveoli have very thin wall consisting of **squamous epithelium.**

332 **(b)**
In the legs of cockroach, tarsus consists of five small, movable joints, the tarsal podomeres. They bears fine hairs. The first four tarsomeres bears soft, adhesive pads called plantulae on the underside near the ends.
In ends in a pair of sharp, curved claws. Between the claws, arolium is a delicate hair-covered pad. Only the tarsus of the legs rest on the ground during walking and running. The claws and pads serves back-slipping of the tarsi during movements
The pad sticks to the hard, smooth surface and the claws grip the soft and smooth surfaces

333 **(c)**
Basophils, a type of leucocytes secrete heparin (anticoagulant) and histamine (a vasodilator).

334 **(c)**
Sensory system of the earthworm do not possess eyes but it possess light and touch sensitive organs (receptor cells) to differentiate between the light intensities and to feel the vibrations in the ground. These sense organs are located on the anterior part of the worm

335 **(b)**
Nephridia.
In earthworms, nephridia regulates the volume and the composition of body fluids. A nephridium begins as a funnel that collects excess fluid from the **coelomic chamber**. This funnel connects with the tubular part of the nephridium, which delivers the wastes through a pore to the surface in the body wall into the digestive tube

336 **(d)**
Arteries, veins, capillaries, heart and blood. The blood here contains haemoglobin and heart is myogenic type.
The vascular system of the frog is well-developed and of closed type. The blood vascular system involves heart, blood vessels and blood. Frogs have the lymphatic system also

337 **(d)**
All the given options are the characteristic features of frog. Below spot represents vestigial pineal eye in forg amplexusory pads are the nuptial pad present in male frog and hallux is the name of first toe of the frog

338 **(a)**
Specialized cell junctions occur at many points of cell-cell and cell-matrix contact in all tissues, but they are particularly important and plentiful in epithelium.

339 **(d)**
Yellow fibrous cartilage tissue is found in pinna (external ear). It is also found at the tip of the nose.

340 **(b)**
Cartilage is a vertebrate skeletal connective tissue. It is an amorphous matrix and contains glycoproteins, basophilic chondroitin and fine collagen fibres. Cartilage helps in bone to bone ligation.

341 **(c)**
The head capsule of a cockroach bears a pair of compound eyes. These are a pair of large, black, kidney-shaped organs situated dorsolaterally on the head, one on the either sides

342 **(b)**
The undigested solid waste moves into the rectum and passes out through the cloaca of frog

343 **(c)**
In water, frog respires through the skin but on land buccal cavity, skin and lungs acts as respiratory organs. The lungs of frogs are similar to humans but the chest muscles are not involved in respiration

344 **(a)**
Pericardium.
A frog heart is solid muscular organ situated in the upper half of body cavity. It is three chambered with two auricles and one ventricle. The ventricle is incompletely divided by an interventricular spetum, while auricles are completely divided by interauricular spetum. Heart is covered by a membrane called pericardium. The potential space between heart and pericardium is called pericardial space. This space is fluid filled and the fluid here is called pericardial fluid. The heart of frog pumps mixed blood as lungs are not much functional is than and most of the oxygenation of blood takes place throngle skin

345 **(b)**
A-Ocellus, B-Compound eye, C-Maxilla, D-Labium E-Labrum, F-Mandible

346 **(d)**
The body of a cockroaches is segmented and divisible into three distinct regions head, thorax and abdomen

347 **(a)**
Metamorphosis is a profound change in the form from one stage to next in the life history of organisms. In frog, it occurs as follows; Egg → Tadpole → Froglets → Frog

348 **(a)**
Squamous epithelium lines the terminal bronchioles, air sacs and alveoli of lungs, etc. Cuboidal epithelium lines small salivary and pancreatic ducts and some portions of the ducts of sweat glands, while compound epithelium is present in the lining of oral cavity, tongue, pharynx and oesophagus. These types of epithelial cells are present on those surfaces which may subject to abrasion but are completely protected from drying

349 **(a)**
Endothelium is a single layer of thin plate-like cells that line the inner surfaces of blood, lymph vessels and the heart. It is made up of **squamous** or pavement epithelium. The edges of its cells fit closely together just like the tiles in a floor.

350 **(a)**
Eyes are well defined sense organs in frogs.
Frog exhibit sexual dimorphism. Male frog can be distinguished by the presence of sound producing vocal sacs and also a copulatory pad on the first digit of the forelimbs which are absent in the female frogs

351 **(b)**
Bidder's canal is found in the kidney of frog. Bidder's canal communicates with the ureter which leaves the kidney near its hind end opens into the cloaca

352 **(b)**
In both the sexes of cockroaches, the 10th segment bears a pair of jointed filamentous structure called anal cerci

353 **(d)**
Many **olfactory glands** (Bowman's glands) occur below the olfactory epithelium that secrete mucus over the epithelium to keep it moist.

354 **(a)**
Cartilage is solid and pliable, resists compression. Intercellular material cells of this tissue (chondrocytes) are enclosed in small cavities within the matrix secreted by them

355 **(b)**
The sense organs of the earthworms are very simple structures. They do not have eyes but possesses the light and touch sensitive organs to distinguish the light intensities and feel the vibration in the ground. These sense organs are most concentrated at the anterior part of the worm

356 **(b)**
The number of spiracles present in cockroaches are 10 pairs

357 **(a)**
The lungs are a pair of elongated, pink coloured sac-like structures present in the upper part of trunk region (thorax) if frog. The respiration by lungs is called pulmonary respiration. Frog uses gulping movement during frog uses gulpring movement during pulmonary respiration as its lungs are (+)ve pressure lungs (pressure remains more than the atmospheric pressure)

358 **(c)**
Prey is captured by the frog by the use of its bilobed tongue. The tongue is sticky and attached by its anterior end. The prey is entirely swallowed without mastication

359 **(c)**
Amphibian RBC_S are largest among the vertebrates. These are flattened and oval, disc-like but slightly biconvex due to a large oval and centrally placed nucleus. Usually in mammals, RBC_S are circular and non-nucleated except those of family-Camilladaceae.

360 **(b)**
Hindwings forms the real organs of flight and are used for flying
They are known as metathoracic wings

361 **(a)**
Refer Ans. 30.

362 **(d)**
Erythrocytes are red blood corpuscles (RBC_S), while monocytes, lymphocytes and neutrophils are white blood corpuscles (WBC_S)

363 **(c)**
Ciliated columnar epithelium lines respiratory tract (lower end of bronchi), fallopian tubes, ventricles of brain (ependyma), central canal of spinal cord, etc.

364 **(a)**
On the basis of pouring their secretions, glands are classified into two categories; Endocrine and Exocrine

365 **(b)**
A-Pharynx, B-Oesophagus, C-Gizzard, D-Stomach, E-Intestinal caecum, F-Lymph gland

366 **(a)**
Epiderm is.
The epidermis of the earthworm is made up of a single layer of columnar epithelial cells, which contains secretary gland cells

367 **(b)**
Animals that lives in self-made burrows are known as fossorial animal. Earthworms lives in burrows made by boring and swallowing the soil therefore, they are known as fossorial animal

368 **(c)**
The body of earthworm is divided into hundred short segments, which are similar. The ventral surface is distinguished by the presence of genital openings (pores)

369 **(d)**
Mast cells are found in the matrix of connective tissue. These are modified basophils of blood. Mast cells are oval in shape and secrete heparin (anticoagulant), histamine (vasodilator) and serotonin (vasoconstrictor).

370 **(c)**
Cockroaches are brown or black bodies animals which belongs to Class-Insecta of phylum-Arthropoda

371 **(b)**
Tendons are the example of dense regular connective tissue. In this, collagen fibres are present in rows between many parallel bundles of fibres

372 **(b)**
The number of fingers in the forelimbs of frog is four

373 **(a)**
Blood glands are present on the 4th, 5th, and 6th segments of the earthworm. They produces blood cells and haemoglobin, which are dissolved in blood plasma. Circulatory system of the earthworm is of closed type

374 **(a)**
The hindbrain of the frog consists of a cerebellum and medulla oblongata. The medulla oblongata passes out through the foramen magnum and

continues into the spinal cord, which is enclosed by vertebral column

375 **(a)**
Mesothoracic wings are thick, opaque and leathery. They are not used in flight. They are only protective in function and serve to cover the metathoracic wings when cockroach is not flying. Therefore, they are called tegmina

376 **(a)**
A pair of spermatheca is present in the 6th segment of the cockroach which opens into the genital chamber. The larger spermatheca stores spermatozoa received from the male during copulation. The smaller one is non-functional

377 **(c)**
A-Labrum, B-Mandible, C-Hypopharynx, D-Maxilla, E-Labium

378 **(a)**
Prey → Mouth → Oesophagus → Stomach → Small intestine → Cloaca

379 **(b)**
On an average, female cockroach produces 9-10 oothecae

380 **(a)**
Frog undergoes the metamorphosis in which its body makes a sudden transition into the adult form. This metamorphosis last only for 24 hours and is initiated by the production of hormone, thyroxine. This causes different tissues to develop in different ways

381 **(a)**
In mature woms the segments 14-16 are covered by a prominent dark band of glandular tissue, called clitellum

382 **(b)**
The ovaries are situated near the kidneys. A pair of oviduct arising from the ovaries opens into the cloaca separately. A mature female can lay 25000 to 30000 ova at a time

383 **(c)**
Diffusion of respiratory gases is the main function of frog's skin

384 **(b)**
The epidermis of the earthworm is made up of a single layer of columnar epithelial cells, which contains secretary gland cells

385 **(b)**
Two atria and one ventricle. etc.
A frog heart is solid muscular organ situated in the upper half of body cavity. It is three chambered with two auricles and one ventricle. The ventricle is incompletely divided by an interventricular spetum, while auricles are completely divided by interauricular spetum. Heart is covered by a membrane called pericardium. The potential space between heart and pericardium is called pericardial space. This space is fluid filled and the fluid here is called pericardial fluid. The heart of frog pumps mixed blood as lungs are not much functional is than and most of the oxygenation of blood takes place throngle skin

386 **(c)**
The Haversian canals are vertical canals present parallel to the length of bones. About 4-20 concentric rings of Haversian lamellae normally surround one Haversian canal. This complete system of lamella along with one Haversian canal is called one osteon and is found in the bone marrow of mammals.

387 **(a)**
The salivary glands in cockroach are fairly large and present near the crop and open by a common salivary duct into preoral cavity

388 **(b)**
A-Oviduct; B-Ovary; C-Ova; D-Cloaca; E-Urinary bladder

389 **(a)**
Vessels, capillaries and heart.
Pheretima exhibits closed type of vascular system, consisting of blood vessels, capillaries and heart. Due to the closed circulatory system, blood is confined to the heart and blood vessels

390 **(d)**
All of given statements are correct

393 **(d)**
Areolar tissue is present beneath the skin and serves as a support framework for epithelium. It contains fibroblasts, macrophages and mast cells

394 **(c)**
Rana temporaria is common British frog

395 **(c)**
Rana tigrina is the common species of frog found in India

396 **(d)**
Connective tissues ranges from soft connective tissues to specialised types, which includes cartilage, bone, and blood

397 **(c)**

Lymph is the fluid filtered out from the blood capillaries. It lacks RBCs and proteins

398 **(d)**
Cell organelles and nucleus are absent in mature red blood cells, therefore, aerobic respiration does not take place.

399 **(a)**
Pharynx of earthworm is also called suctorial pharynx

400 **(b)**
Basophils are non-phagocytic in nature. Their nucleus is usually **trilobed** and **irregular shaped**.

401 **(c)**
Frog has different types of sense organs like sensory papillae (organs of touch), taste buds (taste), nasal epithelium (smell), vision (eyes), tympanum with internal ears (hearing). Out of these, eyes and internal ears are well organised structures and rest are cellular aggregations around the nerve endings

402 **(b)**
Cockroach is the uricotelic animal because uric acid is the main nitrogenous waste material they excrete

403 **(d)**
F, F, T, F
Frogs have a lymphatic system and they are ureotelic animals, *i.e.*, they excrets urea.
Sound producing vocal cords are present in male frogs, not in female frog

404 **(d)**
Both (a) and (b).
In the head region of cockroach, brain is represented by supra-oesophageal ganglion, which supplies the nerves to antennae and compound eyes

405 **(a)**
Frog exhibit sexual dimorphism. Male frog can be distinguished by the presence of sound producing vocal sacs and also a copulatory pad on the first digit of the forelimbs which are absent in the female frogs

406 **(b)**
Maxilla

407 **(b)**
Periplaneta bears compound eyes, which are situated dorsolaterally on the head one on the either sides
Cockroaches are dioecious and both sexes have well-developed reproductive organs. Female bears collateral glands, while mushroom glands are present in males

408 **(b)**
Collagen is a protein consisting of tiny reticular fibrils. These combine to form the white glistering inelastic fibres of tendons and ligaments.

409 **(a)**
Nervous system of the earthworms comprises a pair of cerebral ganglia, located on the pharynx in 3rd segment

410 **(a)**
Urate cell stores the nitrogenous waste in cockroaches

411 **(a)**
Male passes a pair of short sytles which are absent in females

412 **(d)**
The bony plates called conchae in the nasal chamber of rabbit are made up of simple ciliated columnar epithelium.

413 **(d)**
Smooth muscles are plain, non-striated, involuntary or unstriped muscles due to absence of striations. These muscles occur in the walls of hollow internal organs, in capsules of lymph glands, spleen etc., in iris and ciliary body of eyes, skin dermis, penis and other accessory genitalia etc.

414 **(a)**
The head of a cockroach shows mobility in all the directions due to the presence of flexible neck. The neck is a slender, flexible tube, articulating the head with the thorax. It is supported by a few ring-like sclerites

415 **(a)**
The skin of the frog acts as respiratory organ in water and on land, the buccal cavity, the skin and the lungs acts as respiratory organs

416 **(b)**
Heart of cockroach is 13 chambered

417 **(b)**
Pseudostratified epithelium always consists of a single layer of irregularly shaped columnar cells touching the basement membrane, *i.e.,* the long cells with oval nuclei and short cells with rounded nuclei. Some of the cells (long cells) extend from the basement membrane to the surface. Hence, although epithelium is one cell thick but it appears to be multilayered or stratified, thus called Pseudostratified.

418 **(b)**

Earthworm contains two pairs of testes in the segment 10th and 11th