Chapter 4. Animal Kingdom

1. Important characteristic that hemichordates share with chordates is
(a) ventral tubular nerve cord
(b) pharynx with gill slits
(c) pharynx without gill slits
(d) absence of notochord. *(NEET 2017)*

2. Which among these is the correct combination of aquatic mammals?
(a) Dolphins, Seals, *Trygon*
(b) Whales, Dolphins, Seals
(c) *Trygon*, Whales, Seals
(d) Seals, Dolphins, Sharks *(NEET 2017)*

3. Which of the following represents order of 'Horse'?
(a) Perissodactyla (b) Caballus
(c) Ferus (d) Equidae
(NEET 2017)

4. In case of poriferans, the spongocoel is lined with flagellated cells called
(a) oscula (b) choanocytes
(c) mesenchymal cells (d) ostia.
(NEET 2017)

5. Choose the correct statement.
(a) All mammals are viviparous.
(b) All cyclostomes do not possess jaws and paired fins.
(c) All reptiles have a three-chambered heart.
(d) All pisces have gills covered by an opercular.
(NEET-II 2016)

6. Which one of the following characteristics is not shared by birds and mammals?
(a) Viviparity
(b) Warm blooded nature
(c) Ossified endoskeleton
(d) Breathing using lungs
(NEET-I 2016)

7. Which of the following characteristic features always holds true for the corresponding group of animals?

(a)	Possess a mouth with an upper and a lower jaw	Chordata
(b)	3–chambered heart with one incompletely divided ventricle	Reptilia
(c)	Cartilaginous endoskeleton	Chondrichthyes
(d)	Viviparous	Mammalia

(NEET-I 2016)

8. Which of the following features is not present in the Phylum Arthropoda?
(a) Parapodia
(b) Jointed appendages
(c) Chitinous exoskeleton
(d) Metameric segmentation
(NEET-I 2016)

9. Body having meshwork of cells, internal cavities lined with food filtering flagellated cells and indirect development are the characteristics of Phylum
(a) Mollusca (b) Protozoa
(c) Coelenterata (d) Porifera.
(2015)

10. Metagenesis refers to
(a) occurrence of a drastic change in form during post-embryonic development
(b) presence of a segmented body and parthenogenetic mode of reproduction
(c) presence of different morphic forms
(d) alternation of generation between asexual and sexual phases of an organism.
(2015)

11. A jawless fish, which lays eggs in fresh water and whose ammocoetes larvae after metamorphosis return to the ocean is
(a) *Neomyxine* (b) *Petromyzon*
(c) *Eptatretus* (d) *Myxine*.
(2015)

12. Which of the following endoparasites of humans does show viviparity?
(a) *Trichinella spiralis*
(b) *Ascaris lumbricoides*
(c) *Ancylostoma duodenale*
(d) *Enterobius vermicularis*
(2015 Cancelled)

13. Which of the following represents the correct combination without any exception ?

	Characteristics	Class
(a)	Sucking and circular mouth; jaws absent, integument without scales; paired appendages.	Cyclostomata
(b)	Body covered with feathers; skin moist and glandular, fore-limbs form wings; lungs with air sacs.	Aves
(c)	Mammary gland; hair on body; pinnae; two pairs of limbs.	Mammalia
(d)	Mouth ventral; gills without operculum; skin with placoid scales; persistent notochord.	Chondrichthyes

(2015 Cancelled)

14. Which of the following animals is not viviparous?
(a) Platypus (b) Whale
(c) Flying fox (Bat) (d) Elephant
(2015 Cancelled)

15. Which of the following characteristics is mainly responsible for diversification of insects on land?
(a) Exoskeleton (b) Eyes
(c) Segmentation (d) Bilateral symmetry
(2015 Cancelled)

16. Select the taxon mentioned that represents both marine and fresh water species.
(a) Echinoderms (b) Ctenophora
(c) Cephalochordata (d) Cnidaria
(2014)

17. Which one of the following living organisms completely lacks a cell wall?
(a) Cyanobacteria
(b) Sea - fan (*Gorgonia*)
(c) *Saccharomyces*
(d) Blue - green algae *(2014)*

18. *Planaria* possesses high capacity of
(a) metamorphosis (b) regeneration
(c) alternation of generation
(d) bioluminescence. *(2014)*

19. A marine cartilaginous fish that can produce electric current is
(a) *Pristis* (b) *Torpedo*
(c) *Trygon* (d) *Scoliodon.*
(2014)

20. Which of the following are correctly matched with respect to their taxonomic classification?
(a) House fly, butterfly, tse-tse fly, silver fish - Insecta
(b) Spiny anteater, sea urchin, sea cucumber - Echinodermata
(c) Flying fish, cuttle fish, silver fish - Pisces
(d) Centipede, millipede, spider, scorpion - Insecta
(NEET 2013)

21. Which group of animals belong to the same phylum?
(a) Prawn, Scorpion, *Locusta*
(b) Sponge, Sea anemone, Starfish
(c) Malarial parasite, *Amoeba*, Mosquito
(d) Earthworm, Pinworm, Tapeworm
(NEET 2013)

22. Match the name of the animal (column I), with one characteristic (column II), and the phylum/ class (column III) to which it belongs.

	Column I	Column II	Column III
(a)	*Limulus*	Body covered by chitinous exoskeleton	Pisces
(b)	*Adamsia*	Radially symmetrical	Porifera
(c)	*Petromyzon*	Ectoparasite	Cyclostomata
(d)	*Ichthyophis*	Terrestrial	Reptilia

(NEET 2013)

23. One of the representatives of Phylum Arthropoda is
(a) puffer fish (b) flying fish
(c) cuttle fish (d) silver fish.
(NEET 2013)

24. The characteristics of Class Reptilia are
(a) body covered with moist skin which is devoid of scales, the ear is represented by a tympanum, alimentary canal, urinary and reproductive tracts open into a common cloaca
(b) fresh water animals with bony endoskeleton, air-bladder to regulate buoyancy
(c) marine animals with cartilaginous endoskeleton, body covered with placoid scales
(d) body covered with dry and cornified skin, scales over the body are epidermal, they do not have external ears.

(Karnataka NEET 2013)

25. Which one of the following groups of animals reproduces only by sexual means?
(a) Cnidaria (b) Porifera
(c) Protozoa (d) Ctenophora

(Karnataka NEET 2013)

26. Which one of the following animals is correctly matched with its one characteristic and the taxon?

	Animal	Characteristic	Taxon
(a)	Millipede	Ventral nerve cord	Arachnida
(b)	Sea anemone	Triploblastic	Cnidaria
(c)	Silverfish	Pectoral and pelvic fins	Chordata
(d)	Duckbilled platypus	Oviparous	Mammalia

(Karnataka NEET 2013)

27. Sharks and dogfishes differ from skates and rays because
(a) gill slits are ventrally placed
(b) head and trunk are widened considerably
(c) distinct demarcation between body and tail
(d) their pectoral fins distinctly marked off from cylindrical bodies.

(Karnataka NEET 2013)

28. Which one of the following is one of the paths followed by air or O_2 during respiration in the adult male *Periplaneta americana* as it enters the animal body?
(a) Spiracle in metathorax, trachea, tracheloes, oxygen diffuses into cells
(b) Mouth, bronchial tube, trachea, oxygen enters cells
(c) Spiracles in prothorax, tracheoles, trachea, oxygen diffuses into cells.
(d) Hypopharynx, mouth, pharynx, trachea, tissues

(Karnataka NEET 2013)

29. *Pheretima* and its close relatives derive nourishment from
(a) sugarcane roots
(b) decaying fallen leaves and soil organic matter
(c) soil insects
(d) small pieces of fresh fallen leaves of maize, etc. *(2012)*

30. In which one of the following, the genus name, its two characters and its phylum are not correctly matched, whereas the remaining three are correct?

(a) *Pila*	(i)	Body segmented Mollusca
	(ii)	Mouth with radula
(b) *Asterias*	(i)	Spiny skinned Echinodermata
	(ii)	Water vascular system
(c) *Sycon*	(i)	Pore bearing Porifera
	(ii)	Canal system
(d) *Periplaneta*	(i)	Jointed appendages Arthropoda
	(ii)	Chitinous exoskeleton

(2012)

31. Which one of the following pairs of animals are similar to each other pertaining to the feature stated against them?

(a) *Pteropus* and *Ornithorhynchus*	-	Viviparity
(b) Garden lizard and crocodile	-	Three chambered heart
(c) *Ascaris* and *Ancylostoma*	-	Metameric segmentation
(d) Sea horse and flying fish	-	Cold blooded (poikilothermal)

(Mains 2012)

32. Which one of the following categories of animals, is correctly described with no single exception in it?
(a) All reptiles possess scales, have a three chambered heart and are cold blooded (poikilothermal).
(b) All bony fishes have four pairs of gills and an operculum on each side.

(c) All sponges are marine and have collared cells.
(d) All mammals are viviparous and possess diaphragm for breathing.
(Mains 2012)

33. What will you look for to identify the sex of the following?
(a) Female *Ascaris*-sharply curved posterior end
(b) Male frog- a copulatory pad on the first digit of the hind limb
(c) Female cockroach-anal cerci
(d) Male shark-claspers borne on pelvic fins
(2011)

34. Which one of the following groups of animals is correctly matched with its characteristic feature without any exception?
(a) Reptilia : possess 3-chambered heart with an incompletely divided ventricle
(b) Chordata : possess a mouth with an upper and a lower jaw
(c) Chondrichthyes : possess cartilaginous endoskeleton
(d) Mammalia : give birth to young ones
(2011)

35. In which one of the following the genus name, its two characters and its class/phylum are correctly matched?

Genus name	Two characters	Class/ Phylum
(a) *Ascaris*	(i) Body segmented (ii) Males and females distinct	Annelida
(b) *Salamandra*	(i) A tympanum represents ear (ii) Fertilization is external	Amphibia
(c) *Pteropus*	(i) Skin possesses (ii) Oviparous	Mammalia
(d) *Aurelia*	(i) Cnidoblasts (ii) Organ level of organization	Coelenterata

(2011)

36. Which one of the following statements is totally wrong about the occurrence of notochord, while the other three are correct?
(a) It is present only in larval tail in ascidian.
(b) It is replaced by a vertebral column in adult frog.
(c) It is absent throughout life in humans from the very beginning.
(d) It is present throughout life in *Amphioxus*.
(Mains 2011)

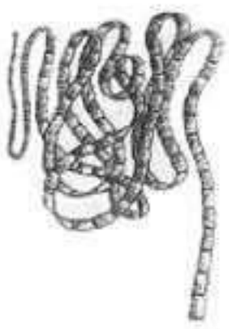
37. Consider the following four statements (A–D) related to the common frog *Rana tigrina*, and select the correct option stating which ones are true (T) and which ones are false (F).

Statements:
A. On dry land it would die due to lack of O_2 if its mouth is forcibly kept closed for a few days.
B. It has four-chambered heart.
C. On dry land it turns uricotelic from ureotelic.
D. Its life-history is carried out in pond water.

	A	B	C	D
(a)	T	F	F	T
(b)	T	T	F	F
(c)	F	F	T	T
(d)	F	T	T	F

(Mains 2011)

38. The figures (A – D) show four animals. Select the correct option with respect to a common characteristic of two of these animals.

(A)  (B) 

(C)  (D) 

(a) (A) and (D) respire mainly through body wall
(b) (B) and (C) show radial symmetry
(c) (A) and (B) have cnidoblasts for self-defence
(d) (C) and (D) have a true coelom.
(Mains 2011)

39. Ureters act as urinogenital ducts in
(a) human males
(b) human females
(c) both male and female frogs
(d) male frogs. *(Mains 2011)*

40. One example of animals having a single opening to the outside that serves both as mouth as well as anus is
(a) *Octopus* (b) *Asterias*
(c) *Ascidia* (d) *Fasciola*.
(2010)

41. Which one of the following statements about all the four of *Spongilla*, leech, dolphin and penguin is correct?
(a) Penguin is homoiothermic while the remaining three are poikilothermic.
(b) Leech is a fresh water form while all others are marine.
(c) *Spongilla* has special collared cells called choanocytes, not found in the remaining three.
(d) All are bilaterally symmetrical.
(2010)

42. Which one of the following kinds of animals are triploblastic?
(a) Flatworms (b) Sponges
(c) Ctenophores (d) Corals
(2010)

43. Which one of the following statements about certain given animals is correct?
(a) Roundworms (Aschelminthes) are pseudocoelomates
(b) Molluses are acoelomates
(c) Insects are pseudocoelomates
(d) Flatworms (Platyhelminthes) are coelomates.
(2010)

44. In which one of the following organisms its excretory organs are correctly stated?
(a) Humans – Kidneys, sebaceous glands and tear glands
(b) Earthworm – Pharyngeal, integumentary and septal nephridia
(c) Cockroach – Malpighian tubules and enteric caeca
(d) Frog – Kidneys, skin and buccal epithelium
(Mains 2010)

45. Crocodile and penguin are similar to whale and dogfish in which one of the following features?
(a) Possess a solid single stranded central nervous system
(b) Lay eggs and guard them till they hatch
(c) Possess bony skeleton
(d) Have gill slits at some stage
(Mains 2010)

46. Which one of the following groups of animals is bilaterally symmetrical and triploblastic?
(a) Aschelminthes (round worms)
(b) Ctenophores
(c) Sponges
(d) Coelenterates (cnidarians) *(2009)*

47. If a live earthworm is pricked with a needle on its outer surface without damaging its gut, the fluid that comes out is
(a) coelomic fluid (b) haemolymph
(c) slimy mucus (d) excretory fluid.
(2009)

48. Which one of the following pairs of animals comprises 'jawless fishes'?
(a) Mackerals and rohu
(b) Lampreys and hag fishes
(c) Guppies and hag fishes
(d) Lampreys and eels *(2009)*

49. Which one of the following in birds, indicates their reptilian ancestry?
(a) Two special chambers crop and gizzard in their digestive tract
(b) Eggs with a calcareous shell
(c) Scales on their hind limbs
(d) Four-chambered heart *(2008)*

50. *Ascaris* is characterized by
(a) presence of true coelom but absence of metamerism
(b) presence of true coelom and metamerism (metamerisation)
(c) absence of true coelom but presence of metamerism
(d) presence of neither true coelom nor metamerism. *(2008)*

51. Which one of the following groups of three animals each is correctly matched with their one characteristic morphological feature?

	Animals		Morphological features
(a)	Scorpion, spider, cockroach	-	ventral solid central nervous system
(b)	Cockroach, locust, *Taenia*	-	metameric segmentation
(c)	Liver fluke, sea anemone, sea cucumber	-	bilateral symmetry
(d)	Centipede, prawn, sea urchin	-	jointed appendages

(2008)

52. Which one of the following pairs of items correctly belongs to the category of organs mentioned against it?
(a) Nephridia of earthworm and Malpighian tubules of cockroach - excretory organs
(b) Wings of honey bee and wings of crow - homologous organs
(c) Thorn of *Bougainvillea* and tendrils of *Cucurbita* - analogous organs
(d) Nictitating membrane and blind spot in human eye - vestigial organs
(2008)

53. Which one of the following phyla is correctly matched with its two general characteristics?
(a) Echinodermata - pentamerous radial symmetry and mostly internal fertilization
(b) Mollusca - normally oviparous and development through a trochophore or veliger larva
(c) Arthropoda - body divided into head, thorax and abdomen and respiration by tracheae
(d) Chordata - notochord at some stage and separate anal and urinary openings to the outside.
(2008)

54. Which one of the following is not a characteristic of Phylum Annelida?
(a) Pseudocoelom
(b) Ventral nerve cord
(c) Closed circulatory system
(d) Segmentation *(2008)*

55. Which of the following pairs are correctly matched?

	Animals		Morphological features
(i)	Crocodile	-	4-chambered heart
(ii)	Sea urchin	-	Parapodia
(iii)	*Obelia*	-	Metagenesis
(iv)	Lemur	-	Thecodont

(a) (ii), (iii) and (iv) (b) only (i) and (iv)
(c) only (i) and (ii) (d) (i), (iii) and (iv)
(2007)

56. Which one of the following is a matching pair of a body feature and the animal possessing it?
(a) Ventral central nervous system - Leech
(b) Pharyngeal gill slits absent in embryo - Chamaeleon
(c) Ventral heart - Scorpion
(d) Post-anal tail - Octopus
(2007)

57. What is common between parrot, platypus and kangaroo?
(a) Toothless jaws
(b) Functional post-anal tail
(c) Ovoparity
(d) Homoiothermy *(2007)*

58. What is true about *Nereis*, scorpion, cockroach and silver fish?
(a) They all possess dorsal heart.
(b) None of them is aquatic.
(c) They all belong to the same phylum.
(d) They all have jointed paired appendages.
(2007)

59. Biradial symmetry and lack of cnidoblasts are the characteristics of
(a) *Hydra* and starfish
(b) starfish and sea anemone
(c) *Ctenoplana* and *Beroe*
(d) *Aurelia* and *Paramecium.* *(2006)*

60. Two common characters found in centipede, cockroach, and crab are
(a) book lungs and antennae
(b) compound eyes and anal cerci
(c) jointed legs and chitinous exoskeleton
(d) green gland and tracheae. *(2006)*

61. In which one of the following sets of animals do all the four give birth to young ones?
(a) Kangaroo, hedgehog, dolphin, *Loris*
(b) Lion, bat, whale, ostrich
(c) *Platypus*, penguin, bat, hippopotamus
(d) Shrew, bat, cat, kiwi *(2006)*

62. Which one of the following is not a living fossil?
(a) *Peripatus* (b) King crab
(c) *Sphenodon* (d) *Archaeopteryx*
(2006)

63. Annual migration does not occur in the case of
(a) arctic tern (b) salmon
(c) siberian crane (d) salamander.
(2006)

64. Metameric segmentation is the characteristic of
(a) mollusca and chordata
(b) platyhelminthes and arthropoda
(c) echinodermata and annelida
(d) annelida and arthropoda. *(2006)*

65. Which one of the following is a matching set of a phylum and its three examples?
(a) Porifera - *Spongilla, Euplectella, Pennatula*
(b) Cnidaria - *Bonellia, Physalia, Aurelia*
(c) Platyhelminthes - *Planaria, Schistosoma, Enterobius*
(d) Mollusca - *Loligo, Teredo, Octopus*
(2006)

66. What is common about *Trypanosoma, Noctiluca, Monocystis* and *Giardia* ?
(a) These are all parasities.
(b) These are all unicellular protists.
(c) They have flagella.
(d) They produce spores. *(2006)*

67. In contrast to annelids the platyhelminthes show
(a) absence of body cavity
(b) bilateral symmetry
(c) radial symmetry
(d) presence of pseudocoel. *(2005)*

68. From the following statements select the wrong one.
(a) Prawn has two pairs of antennae.
(b) Nematocysts are characteristics of the phylum cnidaria.
(c) Millepedes have two pairs of appendages in each segment of the body.
(d) Animals belonging to phylum porifera are marine and fresh water. *(2005)*

69. Which of the following unicellular organisms has a macronucleus for trophic function and one or more micronuclei for reproduction?
(a) *Euglena* (b) *Amoeba*
(c) *Paramecium* (d) *Trypanosoma*
(2005)

70. Which one of the following characters is not typical of the class mammalia?
(a) Thecodont dentition
(b) Alveolar lungs
(c) Ten pairs of cranial nerves
(d) Seven cervical vertebrae *(2005)*

71. In Arthropoda, head and thorax are often used to form cephalothorax, but in which one of the following classes, is the body divided into head thorax and abdomen?
(a) Insecta
(b) Myriapoda
(c) Crustacea
(d) Arachnida and curstacea *(2004)*

72. The animals with bilateral symmetry in young stage, and radial pentamerous symmetry in the adult stage, belong to the Phylum
(a) Annelida (b) Mollusca
(c) Cnidaria (d) Echinodermata.
(2004)

73. Presence of gills in the tadpole of frog indicates that
(a) fish were amphibious in the past
(b) fish evolved from frog-like ancestors
(c) frogs will have gills in future
(d) frogs evolved from gilled ancestors.
(2004)

74. Uricotelism is found in
(a) mammals and birds
(b) fish and fresh water protozoans
(c) birds, land reptiles and insects
(d) frogs and toads. *(2004)*

75. One of the following is a very unique feature of the mammalian body
(a) homeothermy
(b) presence of diaphragm
(c) four chambered heart
(d) rib cage. *(2004)*

76. When a fresh-water protozoan possessing a contractile vacuole, is placed in a glass containing marine water, the vacuole will
(a) increase in number
(b) disappear
(c) increase in size
(d) decrease in size. *(2004)*

77. Bartholin's glands are situated
(a) on the sides of the head of some amphibians
(b) at the reduced tail end of birds
(c) on either side of vagina in humans
(d) on either side of vas deferens in humans.
(2003)

78. The chief advantage of encystment of an *Amoeba* is
(a) the ability to survive during adverse physical conditions
(b) the ability to live for some time without ingesting food
(c) protection from parasites and predators
(d) the chance to get rid of accumulated waste products. *(2003)*

79. Systemic heart refers to
(a) the heart that contracts under stimulation from nervous system
(b) left auricle and left ventricle in higher vertebrates
(c) entire heart in lower vertebrates
(d) the two ventricles together in humans. *(2003)*

80. *Sycon* belongs to a group of animals, which are best described as
(a) unicellular or acellular
(b) multicellular without any tissue organization
(c) multicellular with a gastrovascular system
(d) multicellular having tissue organization, but no body cavity. *(2003)*

81. During the life-cycle, *Fasciola hepatica* (liver fluke) infects its intermediate host and primary host at the following larval stages respectively
(a) redia and miracidium
(b) cercaria and redia
(c) metacercaria and cercaria
(d) miracidium and metacercaria. *(2003)*

82. Ommatidia serve the purpose of photoreception in
(a) cockroach (b) frog
(c) humans (d) sunflower. *(2003)*

83. Which one of the following is a matching pair of an animal and a certain phenomenon it exhibits?
(a) *Pheretima* – Sexual dimorphism
(b) *Musca* – Complete metamorphosis
(c) *Chameleon* – Mimicry
(d) *Taenia* – Polymorphism *(2003)*

84. Given below are four matchings of an animal and its kind of respiratory organ :
(A) Silver fish – Trachea
(B) Scorpion – Book lung
(C) Sea squirt – Pharyngeal slits
(D) Dolphin – Skin
The correct matchings are
(a) (A) and (B) (b) (A), (B) and (C)
(c) (B) and (D) (d) (C) and (D). *(2003)*

85. In which of the following animals nerve cell is present but brain is absent?
(a) Sponge (b) Earthworm
(c) Cockroach (d) *Hydra* *(2002)*

86. In which of the following animals dimorphic nucleus is found?
(a) *Amoeba proteus*
(b) *Trypanosoma gambiense*
(c) *Plasmodium vivax*
(d) *Paramecium caudatum* *(2002)*

87. In which of the following, notochord is present in embryonic stage?
(a) All chordates (b) Some chordates
(c) Vertebrates (d) Non chordates *(2002)*

88. In protozoa like *Amoeba* and *Paramecium*, the organ for osmoregulation is
(a) contractile vacuole (b) mitochondria
(c) nucleus (d) food vacuole. *(2002)*

89. In which of the following animals, haemocyanin pigment is found?
(a) Annelida (b) Echinodermata
(c) Insecta (d) Mollusca *(2001)*

90. In which of the following animals post anal tail is found?
(a) Earthworm
(b) Lower invertebrates
(c) Scorpion
(d) Snake *(2001)*

91. In *Hydra*, waste material of food digestion and nitrogenous waste material are removed respectively from
(a) mouth and mouth
(b) body wall and body wall
(c) mouth and body wall
(d) mouth and tentacles. *(2001)*

92. Cleavage in mammals is
(a) holoblastic equal
(b) holoblastic unequal
(c) superficial
(d) discoidal. *(2000)*

93. Which of the following animals have scattered cells with cell - tissue grade organisation?
(a) Sponge (b) *Hydra*
(c) Liver fluke (d) *Ascaris* *(2000)*

94. Similarity in *Ascaris lumbricoides* and *Anopheles stephensi* is
(a) sexual dimorphism
(b) metamerism
(c) anaerobic respiration
(d) endoparasitism. *(2000)*

95. What happens if bone of frog is kept in dilute hydrochloric acid?
(a) Will become flexible
(b) Will turn black
(c) Will break into pieces
(d) Will shrink *(2000)*

96. Which of the following characters is absent in all chordates?
(a) Diaphragm
(b) Coelom
(c) Pharyngeal gill clefts
(d) Dorsal nerve cord *(2000)*

97. What is true for mammalia?
(a) *Platypus* is oviparous.
(b) Bats have feather.
(c) Elephant is ovoviviparous.
(d) Diaphragm is absent in them. *(2000)*

98. Aquatic reptiles are
(a) ureotelic
(b) ureotelic in water
(c) ammonotelic
(d) ureotelic over land. *(1999)*

99. Temperature changes, in the environment, affect most of the animals which are
(a) poikilothermic (b) homoiothermic
(c) aquatic (d) desert living. *(1999)*

100. The canal system is a characteristic feature of
(a) echinoderms (b) sponges
(c) helminthes (d) coelenterates. *(1999)*

101. Which of the following is not found in birds?
(a) Pelvic girdle (b) Pectoral girdle
(c) Hindlimb (d) Forelimb *(1999)*

102. The long bones are hollow and connected by air passages. They are the characteristics of
(a) reptilia (b) land vertebrates
(c) aves (d) mammals. *(1998)*

103. Solenocytes are the main excretory structures in
(a) echinodermates (b) platyhelminthes
(c) annelids (d) molluscs. *(1998)*

104. Most appropriate term to describe the life cycle of *Obelia* is
(a) metamorphosis (b) neoteny
(c) metagenesis (d) all of these. *(1998)*

105. The lower jaw in mammals is made up of
(a) dentary (b) maxills
(c) angulars (d) mandible. *(1998)*

106. Which one of the following cells, found in testes of rabbit, secretes male hormone?
(a) Epithelial cells (b) Spermatocytes
(c) Leydig's cell (d) Sertoli cells *(1998)*

107. What is common among silverfish, scorpion, crab and honey bee?
(a) Jointed legs (b) Metamorphosis
(c) Compound eyes (d) Poison glands *(1997)*

108. The embryonated egg of *Ascaris* represents
(a) an egg with blastula
(b) an egg with a juvenile
(c) an egg with an egg
(d) an egg with gastrula. *(1997)*

109. Which of the following statements is without exception for sponges?
(a) They all have calcareous spicules.
(b) They have high regenerative power.
(c) They are found only in marine water.
(d) They are all radially symmetrical. *(1996)*

110. When an animal has both the characters of male and female, it is called
(a) super female (b) super male
(c) intersex (d) gynandromorph. *(1996)*

111. Coelom is found between
(a) body wall and ectoderm
(b) ectoderm and endoderm
(c) mesoderm and body wall (endoderm)
(d) mesoderm and ectoderm. *(1996)*

112. Pneumatic bone is found in
(a) shark (b) *Rana*
(c) pigeon (d) whale. *(1996)*

113. The nephridia in earthworm are analogous to
(a) nematoblasts of *Hydra*
(b) flame cells of *Planaria*
(c) gills of prawn
(d) trachea of insects. *(1996)*

114. Which of the following is common among mammals?
(a) They undergo no moulting.
(b) They have seven cervical vertebrae.
(c) They are carnivores.
(d) They have ventral nerve cord. *(1996)*

115. The formation of canal system in sponges is due to
(a) folding of inner walls
(b) gastro-vascular system
(c) reproduction
(d) porous walls. *(1996)*

116. Which of the following organisms possesses characteristics of a plant and an animal?
(a) *Euglena* (b) *Paramecium*
(c) Bacteria (d) *Mycoplasma*
(1995)

117. Besides annelida and arthropoda, the metamerism is exhibited by
(a) mollusca (b) acanthocephala
(c) cestoda (d) chordata. *(1995)*

118. The function of contractile vacuole, in protozoa, is
(a) osmoregulation (b) reproduction
(c) locomotion (d) digestion of food.
(1995)

119. The organisms attached to the substratum, generally, possess
(a) one single opening of the digestive canal
(b) cilia on the surface to create water current
(c) radial symmetry
(d) asymmetrical body. *(1995)*

120. The sympathetic nerves, in mammals, arise from
(a) sacral nerves
(b) 3rd, 7th, 9th and 10th cranial nerves
(c) thoraco-lumbar nerves
(d) cervical nerves. *(1995)*

121. The oestrous cycle is a characteristic of
(a) human females only
(b) mammalian females other than primates
(c) human males only
(d) mammalian males other than primates.
(1995)

122. A common characteristic of all vertebrates without exception is
(a) the division of body into head, neck, trunk and tail
(b) their body covered with an exoskeleton
(c) the possession of two pairs of functional appendages
(d) the presence of well-developed skull.
(1994)

123. One of the special characters of coelenterata only is the occurrence of
(a) polymorphism (b) flame cells
(c) hermaphroditism (d) nematocysts.
(1994)

124. Radial symmetry is, usually, exhibited in animals which
(a) are attached to the substratum
(b) have one opening of alimentary canal
(c) live in water
(d) have ciliary mode of feeding. *(1994)*

125. Which of the following is an example of platyhelminthes?
(a) *Plasmodium* (b) *Schistosoma*
(c) *Trypanosoma* (d) *Wuchereria*
(1994)

126. Among the following organisms point out a completely non-parasitic form
(a) tape worm (b) mosquito
(c) sea anemone (d) leech. *(1994)*

127. Tube feet are the characteristic structures of
(a) starfish (b) jellyfish
(c) crayfish (d) cuttlefish. *(1994)*

128. Two examples in which the nitrogenous wastes are excreted from body in the form of uric acid are
(a) birds and lizards
(b) frogs and cartilaginous fish
(c) insects and bony fish
(d) mammals and molluscs. *(1994)*

129. In man and mammals, air passes from outside into the lungs through
(a) nasal cavity, larynx, pharynx, trachea, bronchi, alveoli
(b) nasal cavity, larynx, pharynx, trachea, bronchioles, alveoli
(c) nasal cavity, pharynx, larynx, trachea, bronchioles, bronchi, alveoli
(d) nasal cavity, pharynx, larynx, trachea, bronchi, bronchioles, alveoli. *(1994)*

130. Which of the following does not have an open circulatory system?
(a) Frog's tadpole (b) Prawn
(c) *Chelifer* (d) Cockroach
(1994)

131. Which is common between ostrich, penguin and kiwi?
(a) Running birds (b) Migratory birds
(c) Flightless birds (d) Four toed birds
(1993)

132. Which one assists in locomotion?
(a) Trichocysts in *Paramecium*
(b) Pedicellariae of star fish
(c) Clitellum in *Pheretima*
(d) Posterior sucker in *Hirudinaria* *(1993)*

133. What is true about *Taenia saginata*?
(a) Life history has pig as intermediate host.
(b) There are two large suckers on scolex.
(c) Rostellar hooks are absent.
(d) Rostellum has double circle of hooks. *(1993)*

134. Which one of the following animals possesses nerve cells but no nerves?
(a) *Hydra* (b) Tapeworm
(c) Earthworm (d) Frog's tadpole *(1993)*

135. Budding is a normal mode of asexual reproduction in
(a) starfish and *Hydra*
(b) *Hydra* and sponges
(c) tapeworm and *Hydra*
(d) sponge and starfish. *(1993)*

136. Tracheae of cockroach and mammal are similar in having
(a) paried nature
(b) noncollapsible walls
(c) ciliated inner lining
(d) origin from head. *(1993)*

137. A larval stage occurs in the life history of all members of the group
(a) frog, lizard and cockroach
(b) *Ascaris*, housefly and frog
(c) housefly, earthworm and mosquito
(d) butterfly, frog and mosquito. *(1993)*

138. Gorilla, chimpanzee, monkeys and humans belong to the same
(a) species (b) genus
(c) family (d) order. *(1993)*

139. What is common in whale, bat and rat?
(a) Absence of neck
(b) Muscular diaphragm between thorax and abdomen
(c) Extra-abdominal testes to avoid high temperature of body
(d) Presence of external ears *(1993)*

140. Bullfrog of India is
(a) *Rana tigrina* (b) *R. sylvatica*
(c) *R. ecutesbeiana* (d) *R. esculenta.*
(1992)

141. Aristotle's lantern occurs in Class
(a) Echinoidea (b) Asteroidea
(c) Holothuroidea (d) Ophiuroidea.
(1992)

142. Starfish belongs to
(a) asteriodea (b) ophiuroidea
(c) holothuroidea (d) crinodiea. *(1992)*

143. Eye of the molluscan group that resembles vertebrate eye is
(a) bivalvia (b) gastropoda
(c) pelecypoda (d) cephalopoda.
(1992)

144. Adult *Culex* and *Anopheles* can be distinguished with the help of
(a) mouth parts/colour (b) sitting posture
(c) antennae/wings (d) feeding habits.
(1992)

145. Sound box of birds is called
(a) pygostyle (b) larynx
(c) syrinx (d) synsacrum. *(1992)*

146. Assertion (A) : *Periplaneta americana* is nocturnal, omnivorous, household pest.
Reason (R) : It is because it acts as scavenger.
(a) A is true but R is false.
(b) A is false but R is true.
(c) Both A and R are true and R is correct explanation of A.
(d) Both A and R are true but R is not correct explanation of A. *(1992)*

147. *Ascaris* larva is called
(a) cysticercus (b) rhabditiform
(c) hexacanth (d) onchosphere.
(1992)

148. What is correct about *Taenia*?
(a) Male organs occur in posterior proglottides.
(b) Male organs occur in anterior proglottides.
(c) Female organs occur in anterior proglottides.
(d) Mature proglottides contain both male and female organs. *(1992)*

149. The simplest type of canal system in Porifera is
(a) ascon type (b) leucon type
(c) sycon type (d) radial type.
(1992)

150. An egg laying mammal is
(a) kangaroo (b) platypus
(c) koala (d) whale. *(1992)*

151. Kidney of adult rabbit is
(a) pronephros (b) metanephros
(c) mesonephros (d) opisthonephros. *(1992)*

152. Homeostasis is
(a) tendency to charge with change in environment
(b) tendency to resist change
(c) disturbance in regulatory control
(d) plants and animal extracts used in homeopathy. *(1991)*

153. Which one occurs in echinodermata?
(a) Bilateral symmetry (b) Radial symmetry
(c) Porous body (d) Soft skin *(1991)*

154. An insect regarded as greatest mechanical carrier of diseases is
(a) *Pediculus* (b) *Cimex*
(c) *Musca* (d) *Xenopsylla*. *(1991)*

155. Metamorphosis of insects is regulated through hormone
(a) pheromone (b) thyroxine
(c) ecdysone (d) all of these. *(1991)*

156. Classification of Porifera is based on
(a) branching (b) spicules
(c) reproduction (d) symmetry. *(1991)*

157. The excretory structures of flatworms/ *Taenia* are
(a) flame cells (b) protonephridia
(c) malpighian tubules (d) green glands. *(1991)*

158. Bladderworm/cysticercus is the larval stage of
(a) tapeworm (b) roundworm
(c) pinworm (d) liver fluke. *(1991)*

159. Ecdysis is shedding of
(a) stratum corneum (b) epidermis
(c) dermis (d) stratum malpighi. *(1990)*

160. Penguin occurs in
(a) Australia (b) Antarctica
(c) Africa (d) America. *(1990)*

161. Kala-azar and Oriental Sore are spread by
(a) housefly (b) bed bug
(c) sand fly (d) fruit fly. *(1990)*

162. Malpighian tubules are
(a) excretory organs of insects
(b) excretory organs of annelids
(c) respiratory organs of insects
(d) respiratory organs of annelids. *(1990)*

163. *Taenia saginata* differs from *Taenia solium* in
(a) absence of scolex hooks
(b) absence of scolex hooks and uterine branching
(c) absence of scolex hooks and presence of both male and female reproductive organs
(d) presence of scolex hooks. *(1990)*

164. Onchosphere occurs in
(a) *Ascaris* (b) *Fasciola*
(c) *Taenia* (d) *Planaria*. *(1990)*

165. Eutherians are characterised by
(a) hairy skin (b) true placentation
(c) ovoviviparity (d) glandular skin. *(1989)*

166. Wish bone of birds is from
(a) pelvic girdle
(b) skull
(c) hind limbs
(d) pectoral girdle/clavicles. *(1989)*

167. Flight muscles of bird are attached to
(a) clavicle (b) keel of sternum
(c) scapula (d) coracoid. *(1989)*

168. A chordate character is
(a) gills
(b) spiracles
(c) post-anal tail
(d) chitinous exoskeleton. *(1989)*

169. Earthworms are
(a) useful
(b) harmful
(c) more useful than harmful
(d) more harmful. *(1989)*

170. Transfer of *Taenia* to secondary host occurs as
(a) oncosphere (b) cysticercus
(c) morula (d) egg. *(1989)*

171. Jelly fish belongs to Class
(a) Hydrozoa (b) Scyphozoa
(c) Anthozoa (d) none of these. *(1989)*

172. Fish which can be used in biological control of mosquitoes/larvicidal fish is
(a) *Eel* (b) carp
(c) cat fish (d) *Gambusia*. *(1989)*

173. Hair occur in all mammals except those of
(a) rodentia (b) chiroptera
(c) primata (d) cetacea. *(1988)*

174. Bird vertebrae are
(a) acoelous (b) heterocoelous
(c) amphicoelous (d) procoelous. *(1988)*

175. Feet of kingfisher are modified for
(a) wading (b) perching
(c) running (d) catching. *(1988)*

176. Both male and female pigeons secrete milk through
(a) salivary glands
(b) modified sweat glands
(c) crop
(d) gizzard. *(1988)*

177. *Typhlops* is
(a) sea snake (b) glass snake
(c) blind snake (d) grass snake. *(1988)*

178. *Necturus* is
(a) hell bender (b) congo eel
(c) mud puppy (d) blind worm. *(1988)*

179. Fire bellied toad is
(a) *Amphiuma* (b) *Bombina*
(c) *Necturus* (d) *Salamandra*. *(1988)*

180. Which is not a true amphibian animal?
(a) Salamander (b) Toad
(c) Tortoise (d) Frog *(1988)*

181. A wood boring mollusc/shipworm is
(a) *Chiton* (b) *Teredo*
(c) *Limax* (d) *Patella*. *(1988)*

182. Silk thread is obtained from silk moth during
(a) pupal stage (b) larval stage
(c) nymph stage (d) adult stage. *(1988)*

183. Organ Pipe Coral is
(a) *Tubipora* (b) *Astraea*
(c) *Helipora* (d) *Fungia*. *(1988)*

Answer Key

1.	(b)	**2.**	(b)	**3.**	(a)	**4.**	(b)	**5.**	(b)	**6.**	(a)	**7.**	(c)	**8.**	(a)	**9.**	(d)	**10.**	(d)
11.	(b)	**12.**	(a)	**13.**	(*)	**14.**	(a)	**15.**	(a)	**16.**	(d)	**17.**	(b)	**18.**	(b)	**19.**	(b)	**20.**	(a)
21.	(a)	**22.**	(c)	**23.**	(d)	**24.**	(d)	**25.**	(d)	**26.**	(d)	**27.**	(d)	**28.**	(a)	**29.**	(b)	**30.**	(a)
31.	(d)	**32.**	(b)	**33.**	(d)	**34.**	(c)	**35.**	(*)	**36.**	(c)	**37.**	(*)	**38.**	(d)	**39.**	(d)	**40.**	(d)
41.	(c)	**42.**	(a)	**43.**	(a)	**44.**	(b)	**45.**	(d)	**46.**	(a)	**47.**	(a)	**48.**	(b)	**49.**	(c)	**50.**	(d)
51.	(a)	**52.**	(a)	**53.**	(c)	**54.**	(a)	**55.**	(d)	**56.**	(a)	**57.**	(d)	**58.**	(a)	**59.**	(c)	**60.**	(c)
61.	(a)	**62.**	(d)	**63.**	(d)	**64.**	(d)	**65.**	(d)	**66.**	(b)	**67.**	(a)	**68.**	(a)	**69.**	(c)	**70.**	(c)
71.	(a)	**72.**	(d)	**73.**	(d)	**74.**	(c)	**75.**	(b)	**76.**	(d)	**77.**	(c)	**78.**	(a)	**79.**	(c)	**80.**	(b)
81.	(d)	**82.**	(a)	**83.**	(b)	**84.**	(b)	**85.**	(d)	**86.**	(d)	**87.**	(a)	**88.**	(a)	**89.**	(d)	**90.**	(d)
91.	(c)	**92.**	(b)	**93.**	(b)	**94.**	(a)	**95.**	(a)	**96.**	(a)	**97.**	(a)	**98.**	(b)	**99.**	(a)	**100.**	(b)
101.	(d)	**102.**	(c)	**103.**	(b)	**104.**	(c)	**105.**	(a)	**106.**	(c)	**107.**	(c)	**108.**	(b)	**109.**	(b)	**110.**	(d)
111.	(c)	**112.**	(c)	**113.**	(b)	**114.**	(a)	**115.**	(d)	**116.**	(a)	**117.**	(d)	**118.**	(a)	**119.**	(c)	**120.**	(c)
121.	(b)	**122.**	(d)	**123.**	(d)	**124.**	(a)	**125.**	(b)	**126.**	(c)	**127.**	(a)	**128.**	(a)	**129.**	(d)	**130.**	(a)
131.	(c)	**132.**	(d)	**133.**	(c)	**134.**	(a)	**135.**	(b)	**136.**	(b)	**137.**	(d)	**138.**	(d)	**139.**	(b)	**140.**	(a)
141.	(a)	**142.**	(a)	**143.**	(d)	**144.**	(b)	**145.**	(c)	**146.**	(d)	**147.**	(b)	**148.**	(d)	**149.**	(a)	**150.**	(b)
151.	(b)	**152.**	(b)	**153.**	(b)	**154.**	(c)	**155.**	(c)	**156.**	(b)	**157.**	(a)	**158.**	(a)	**159.**	(a)	**160.**	(b)
161.	(c)	**162.**	(a)	**163.**	(a)	**164.**	(c)	**165.**	(b)	**166.**	(d)	**167.**	(b)	**168.**	(c)	**169.**	(a)	**170.**	(a)
171.	(b)	**172.**	(d)	**173.**	(d)	**174.**	(b)	**175.**	(a)	**176.**	(c)	**177.**	(c)	**178.**	(c)	**179.**	(b)	**180.**	(c)
181.	(b)	**182.**	(a)	**183.**	(a)														

(*) *None of these.*

EXPLANATIONS

1. (b) : An important characteristics that hemichordates and chorddates share is presence of pharyngeal gill slits. Gill slits are dorsal in position in hemichordates whereas they are lateral in chordates. A true unotochord does not occur in hemichordates. Nervous system is distinctly of vertebrate type being intraepidermal in position and having a ventral nerve cord.

2. (b) : Whales, dolphin and seals are examples of aquatic mammals. *Trygon* and sharks are cartilaginous fishes.

3. (a) : Perissodactyla represents the order of horse. Equidae is the family, *caballus* is the subspecies whereas *E. ferus* is the species of horse.

4. (b) : Spongocoel is the central body cavity of the sponges. It is lined by highly specialised flagellated cells called choanocytes.

5. (b) : *Ornithorhynchus* and *Tachyglossus* are oviparous mammals. Crocodile is a reptile which possesses four chambered heart. In cartilaginous fish (except *Chimaera*) gills are not covered by an operculum.

6. (a) : All birds are oviparous while all mammals except *Ornithorhyncus* (duck billed platypus) and *Echidna* or *Tachyglossus* (spiny anteater) are viviparous.

7. (c) : Phylum Chordata includes both jawless vertebrates (Agnatha) and jawed vertebrates (Gnathostomata). Crocodile of Class Reptilia has four chambered heart with two auricles and two ventricles. Duck billed platypus and spiny anteater are oviparous mammals.

8. (a) : Parapodia are flattened, fleshy, vertical flap-like outgrowths of body wall found in annelids on lateral sides of trunk segments. These are hollow structures enclosing coelom which is continuous with that of trunk segments. These serve the dual purpose of locomotion and respiration.

9. (d) : Phylum Porifera (the sponges) has cellular level of body organisation, with inner cellular layer consisting of highly specialised flagellated cells called choanocytes (or collar cells). The development in this phylum is indirect as it includes a free swimming larva called amphiblastula or parenchymula for dispersal of the species.

10. (d) : An alternation of generation between asexual and sexual phases of an organism is referred to as metagenesis. *E.g.* in *Obelia* (a coelenterate), polyps reproduce asexually and medusae reproduce sexually.

11. (b) : *Petromyzon* (Lamprey) belongs to the Class-Cyclostomata of Phylum-Chordata. It is a jawless fish which lays eggs in fresh water. The eggs hatch in about 3 weeks into minute transparent larvae called ammocoetes. After metamorphosis, the young lampreys swim down to the sea where they remain for 3 or 4 years before reaching maturity, when they once again migrate to streams or rivers to spawn and die. Gonads become mature at that time when adults return to rivers for spawning.

12. (a) : *Trichinella spiralis* is a minute nematode parasite that shows viviparity *i.e.*, produces live youngs (larvae) not eggs. The adults of *T. spiralis* live in the human small intestine, where the females release large numbers of larvae. These larvae bore through the intestine and can cause trichinosis or trichiniasis which has symptoms like diarrohea, nausea, vertigo, pain in limbs and fever etc.
Humans get infected after eating imperfectly cooked meat infected with the parasite's larval cysts.

13. None of the options is correct.
Cyclostomes do not have paired appendages. Skin in Aves is neither moist nor glandular. Only preen gland is present at the base of tail. Chondrichthyes members have gills without operculum, except *Chimaera*. Prototherian mammals do not have ear pinnae and aquatic mammals lack hindlimbs (like whales and dolphins).

14. (a) : Duck-billed platypus is an egg laying mammal. It is found in the rivers in eastern Australia and Tasmania. It is a beaver like monotreme about 50-60 cm long and well adapted to live in water. Usually, two eggs are laid at a time. The female curls around them for incubation and remains inactive for about two weeks. Newly hatched young ones are very immature, naked, blind and each is 2.5 cm long.

15. (a) : Exoskeleton made of cuticle has enabled insects to live on land and to diversify to almost all the possible habitats. It gives them protection, support and also helps to prevent desiccation.

16. (d) : Cnidarians are the sac-like animals which are aquatic, mostly marine except a few like *Hydra*,

are fresh water. They are the simplest organisms that have attained a tissue level of organization. Members of Ctenophora, Cephalochordata and Echinodermata are exclusively marine.

17. (b) : *Gorgonia* (sea fan) is an animal belonging to phylum Coelenterata. All animals lack cell wall.

18. (b) : *Planaria* possesses high degree of regeneration. Both epimorphosis, in which the missing parts are formed and morphallaxis, in which the whole body can be regenerated from a fragment of the body, occurs.

19. (b): *Torpedo* is a bottom-living marine fish, discharging electricity which is sufficient to stun preys such as small fishes, etc. A pair of electric organs are situated on the dorsal side of the trunk region. Infact the electric organs are the modified lateral muscle-plates innervated by the cranial nerves.

20. (a) : Spiny anteater (*Echidna*) is a prototherian mammal whereas, sea urchins and sea cucumber are echinoderms. Silver fish (*Lepisma*) is an insect, Cuttle fish (*Sepia*) is a mollusc and flying fish (*Exocoetus*) is a bony fish. Centipede is class chilopoda, Millipede is class diplopoda and Scorpion and Spider are class arachnida of Phylum Arthropoda.

21. (a) : Prawn, Scorpion and *Locusta* belong to the phylum Arthropoda. All other animals categories are given below:

Sponge	□	Porifera
Sea anemone	□	Coelenterata
Starfish	□	Echinodermata
Malarial parasite, *Amoeba*	□	Protozoa
Mosquito	□	Arthropoda
Earthworm	□	Annelida
Pinworm	□	Aschelminthes
Tapeworm	□	Platyhelminthes

22. (c)

23. (d) : Phylum Arthropoda is the largest phylum of Animalia which includes insects. Examples include *Apis*, silkworm, *Laccifer*, silver fish (*Lepisma*), locust, etc. Puffer fish and flying fish (*Exocoetus*) are examples of superclass Pisces, while cuttle fish (*Sepia*) belongs to Mollusca.

24. (d) : Reptiles represent the first class of vertebrates fully adapted for life in dry places on land. The characters of reptiles are in fact a combination of characters that are found in fish and amphibians on one hand and birds and mammals on the other. Their exoskeleton is of horny epidermal scales, shields, plates and scutes. The skin is dry, cornified and devoid of glands. Reptiles lack external ears and have immovable eyelids.

25. (d) : In ctenophores, asexual reproduction is absent. They are monoecious and fertilization is generally external. In cnidaria, asexual reproduction (budding) is found in the polyps and sexual reproduction is found in the medusa form. Both asexual and sexual reproduction occur in porifera (sponges). Asexual reproduction occurs by budding and gemmules. In protozoa, asexual reproduction takes place by binary fission, budding etc. and sexual reproduction takes place by syngamy and conjugation.

26. (d) : Duckbilled platypus is oviparous and belongs to class Mammalia. Millipede belongs to class Diplopoda. Sea anemone has two germ layers, *i.e.*, diploblastic. Silverfish (*Lepisma*) belongs to nonchordata. It is an insect.

27. (d) : Sharks and dogfishes have cylindrical body while skates and rays have both of their pectoral fins fused. It gives a wing-like appearance and are not distinct from body.

28. (a) : The respiratory system is well developed in a cockroach in order to compensate the poorly developed circulatory system. It consists of tracheae, tracheoles and spiracles. The main tracheal trunks open to the exterior on body surface through 10 pairs of segmentally arranged apertures termed spiracles or stigmata. Two pairs of spiracles are thoracic, one between pro and mesothorax and the other between meso and metathorax. Haemocoel contains a network of elastic, closed and branching air tubes or tracheae. The ultimate finer branches of tracheae are called tracheoles which come in contact with the individual body cells. The elaborate tracheal system carries oxygen directly to all the body cells.

29. (b) : *Pheretima* (earthworm) and related organisms feed upon the decaying organic matter found in the soil. They also feed on the bits of plants and animal matter. Thus, they are omnivorous.

30. (a) : *Pila* belongs to phylum mollusca. The body of molluscs (soft bodied animals) is unsegmented, with a distinct head, muscular foot and visceral hump. Radula is found in mouth of *Pila*.

31. (d) : Sea horse (*Hippocampus*) and flying fish (*Exocoetus*) belong to class osteichthyes of super class pisces. They have two chambered heart (one auricle and one ventricle) and are cold blooded animals.

32. (b) : Heart is generally 3-chambered in reptiles but in crocodile, it is 4-chambered. Sponges are generally marine and have collared cells but few fresh water forms can also be seen like *Spongilla*. All mammals are viviparous (giving birth to young ones) with an exception, *Ornithorhynchus* (platypus), which is oviparous (egg laying).

33. (d) : Tail end is straight in female *Ascaris*, while tail end is curved ventral words in male *Ascaris*. Anal cerci is present in both male and female cockroach, while anal style is present only in the male cockroach. The forelimbs in both frogs (male and female) bear small articular pads dorsally at the joints of digit, but the males possess a special nuptial, copulatory pad on ventral side of the first finger of each forelimb. Copulatory pad appears merely as rough patches, but during breeding season, these become thick and sticky. In copulation, the male strongly grips a female under her armpits by means of these pads. Claspers are modified inner edges of pelvic fins in male sharks.

34. (c)

35. None of the options is correct.

Ascaris is member of phylum Nematoda, which are round worms. They do not have segmented body. In ascaris female is longer than male.

Salamandra is member of amphibia. Salamanders do not have tympanum, although they have greatly reduced middle ears and fertilization is usually internal in them.

Pteropus is member of class mammalia. They are viviparous A mantle of golden hair covers the head, neck and shoulders in *Pteropus*.

Aurelia is member of coelenterata, which has tissue level of organization. Its epidermis contain cnidoblasts (stinging cells) for defence and offence purpose.

36. (c) : Humans are mammals which are chordates. Phylum chordata includes animals which possess a notochord either throughout or during early embryonic life. In *Ascidia* (urochordata), notochord is present only in larval tail while in *Amphioxus* (cephalochordata), it extends from head to tail region and is persistent throughout their life. It is replaced by a vertebral column in adult frog.

37. None of the options is correct.

Frog respires in three different manners; cutaneous or skin respiration; buccopharyngeal respiration; pulmonary or lung respiration. Lungs are poorly developed in frog, the inadequate supply of O_2 obtained through lungs is supplemented through moist skin and buccal cavity. Hence, first statement is false. Heart of frog has three chambers, two atria and one ventricle. Hence, second statement is false. The frog excretes urea and thus is a ureotelic animal. The elimination of nitrogenous wastes is carried out by a well developed excretory system. The excretory system consists of a pair of kidneys, ureters, cloaca and urinary bladder. Frog do not change into uricotelic animal in any condition. Hence, third statement is false. In frog, fertilization is external and takes place in water. Within two weeks, fertilized eggs or zygotes develop into free-swimming aquatic larvae, called tadpoles, which undergo metamorphosis to become adult terrestrial frogs.

38. (d) : The animals which possess true coelom are called eucoelomates or coelomates. The true coelom is a body cavity which arises as a cavity in embryonic mesoderm. True coelom is of two types; schizocoelom (schizocoel) and enterocoelom (enterocoel). Schizocoelom develops as a split in the mesoderm sheet. It is found in annelids, arthropods, molluscs. In enterocoelom, mesoderm arises from the wall of the embryonic cut of enteron as hollow outgrowths. It occurs in echinoderms and chordates.

39. (d) : In male frogs, two ureters act as urinogenital duct which open into the cloaca. They run backwards from the kidneys and open into the cloaca. In female ureters carry urine alone, while in male both sperms and urine are carried. Hence, are called urinogenital ducts.

40. (d) : In *Fasciola* (flatworms) the body has a single cavity with one opening to the outside. The single opening functions as both mouth for ingestion (intake of food) and anus for egestion (undigested food is passed out). It is called blind sac plan. Other examples are coelenterates.

41. (c) : *Spongilla* is a common, widely distributed fresh water sponge belonging to phylum porifera. Canal system in *Spongilla* is essentially of rhagon type with choanocytes restricted to small rounded chambers. It is not found in leech, dolphin and penguin.

42. (a) : Triploblastic is a condition which describes an animal having a body composed of three embryonic germ layers : the ectoderm, mesoderm and endoderm. Most multicellular animals belonging to phylum platyhelminthes to phylum chordata are triploblastic. Ctenophores, sponges and corals are diploblastic.

43. (a) : Acoelomates are animals having no body cavity or coelom. Examples are poriferans coelenterates, ctenophora, platyhelminthes and nemertinea. In pseudocoelomates, body space is pseudocoelom or false coelom. Examples are ectoprocta, aschelminthes. In coelomates, body space is a true coelom enclosed by mesoderm on both sides. Remaining phyla of bilateria, from annelida to arthropoda are coelomates. Molluses and insects are coelomates while flatworms are acoelomates.

44. (b) : Nephridia is the excretory organ of the earthworm. Earthworms have three types of nephridial structures called as septal, integumentary and pharyngeal nephridia. These three nephridial structures are present on different positions in the body and also vary in structures. Septal and pharyngeal nephridia are both enteronephric *i.e.*, nitrogen products are expelled in gut. Integumentary nephridia is exonephric *i.e.*, nitrogen waste products are directly discharged outside.

45. (d) : Animals belonging to Phylum Chordata are fundamentally characterised by the presence of a notochord, a dorsal hollow nerve cord and paired pharyngeal gill slits. Crocodile, penguin, whale and dogfish are all chordates. All of them have gill slits or have had it during embryonic development. Thus, paired gill slits are present in these animal at some stage of life.

46. (a) : Aschelminthes is a superphylum consisting of pseudocoelomates. These are mostly aquatic, free living or parasitic. Their body is slender, bilaterally symmetrical and triploblastic.

47. (a) : Coelom or body cavity of earthworm is filled with coelomic fluid. It lies between body wall and alimentary canal. So if a live earthworm is pricked with a needle on its outer surface without damaging the gut then only coelomic fluid will come out.

48. (b) : Agnatha is subphylum or superclass of marine and fresh water vertebrates that lack jaws. They are fish-like animals with cartilaginous skeletons and well-developed sucking mouthparts with horny teeth. The only living agnathans are lampreys and hagfishes (Class Cyclostomata), which are parasites or scavengers.

49. (c) : Birds have originated from some ancestral reptilian stalk. These two classes have so many features in common that link the two groups. The evidence of reptilian ancestry of birds is furnished by their comparative anatomy, embryology and palaeontology. One of the features is that all birds have horny epidermal scales confined to the lower parts of their legs and feet, which are exactly like the epidermal scales of the reptiles.

50. (d) : *Ascaris* belong to the Phylum Nematoda of Superphylum Aschelminthes. They have a cylindrical body without showing any metamerism, a pseudocoel (false coelom) and a complete digestive tract lined by endodermal epithelium. The cuticle covering the body surface bears minute transverse striations giving a pseudosegmented appearance to the worm.

51. (a) : Scorpion, spider and cockroach belong to Phylum Arthropoda and are invertebrates. They possess ventral solid central nervous system which consists of a dorsal brain connected with a nerve ring to a double ventral nerve cord.

52. (a) : Nephridia are excretory organs of earthworm which consist of a simple or branched tube formed by the ingrowth of ectoderm with cilia at the inner end. Excretory products diffuse into the nephridium and are wafted to the exterior by ciliary action. Malpighian tubules are the organs that are involved in the excretion of nitrogenous wastes in cockroach. It open into the intestine; selectively extract from the blood uric acid, which-together with water and salts – is deposited into the hindgut and excreted in the faeces.

53. (c) : Arthropods are the largest phylum of Kingdom Animalia that characteristically possesses an outer body layer – the cuticle. The body is composed of segments usually forming distinct specialized body regions, *i.e.*, head, thorax and abdomen. In them the trachea or windpipe or book lungs are the respiratory organs found in terrestrial forms, which help in respiration.

54. (a) : Phylum Annelida comprises invertebrates, which are segmented worms having cylindrical soft bodies showing metameric segmentation. These are triploblastic animals showing bilateral symmetry. A true coelom is present which is filled with coelomic fluid containing cells. Annelids are perhaps the first animals to have a true schizocoelic coelom.

55. (d) : Reptiles have two auricles and a partly divided ventricle except crocodiles which have four-chambered heart. *Obelia* shows metagenesis *i.e.*, alternation of generations which may be defined as a phenomenon in which diploid asexual phase alternates with haploid sexual phase. Lemur has a thecodent teeth *i.e.*, the teeth are embedded in the sockets of the jaw bone.

56. (a)

57. (d) : Homoiothermy is the maintenance by an animal of its internal body temperature at a relatively constant value by using metabolic processes to counteract fluctuations in the temperature of the environment. Homoiothermy occurs in birds and mammals, which are described as endotherms. The heat produced by their tissue metabolism and the heat lost to the environment are balanced by various means to keep body temperature constant: 36-38°C in mammals and 38-40°C in birds. The hypothalamus

in the brain monitors blood temperature and controls thermoregulation by both nervous and hormonal means. Thus parrot (bird) and platypus and kangaroo (mammals) are homoiothermic animals.

58. (a) : *Nereis*, scorpion, cockroach and silver fish are all invertebrates and thus possess dorsal heart. *Nereis* is a marine animal while other animals mentioned in the question are terrestrial. *Nereis* belongs to Phylum Annelida while rest of the animals belong to Phylum Arthropoda. Jointed appendages are present in scorpion, cockroach and silver fish.

59. (c) : Ctenophora is a small phylum of exclusively marine, invertebrate animals. *Ctenoplana* and *Beroe* are examples of ctenophora. They have biradial symmetry (a combination of radial and bilateral symmetries).

They lack the specialized stinging cells (nematocysts) found in coelenterates, but one species (*Haeckelia rubra*) incorporates those of its jellyfish prey for its own defense.

60. (c) : Centipede, cockroach, and crab all belong to phylum arthropoda which are characterized by jointed legs and chitinous exoskeleton. Arthropods have bilaterally symmetrical and metamerically segmented body with haemocoel and open blood vascular system.

61. (a) : Kangaroo, hedgehog, dolphin and *Loris* are mammals and thus give brith to young ones. Ostrich and kiwi are brids that lay eggs. *Platypus* is a most primitive living mammal that lays eggs. Other animals in the options are mammals and give birth to young ones.

62. (d) : Living fossil is a term for any living species (or clade) of organism which closely resembles species otherwise only known from fossils and has no close living relatives. These species have all survived major extinction events, and generally retain low taxonomic diversities.

Some examples of living fossils in animals are – coelocanth, coral (polyp), crocodylia (crocodiles, gavials and alligators), horseshoe crab (*Limulus polyphemus*), monotremes (*Platypus* and *Echidna*), snout-nosed frog (*Nasikabatrachus sahyadrensis*). *Archaeopteryx* is the earliest and most primitive known bird to date. It lived in the Jurassic Period around 150-155 million years ago. It has feathers and wings but it also had teeth and a skeleton similar to a small carnivorous dinosaur, therefore, it had both bird and theropod dinosour features. *Archaeopteryx* is a powerful piece of evidence that shows that birds have evolved from dinosaurs.

63. (d) : Migration is the seasonal movement of complete populations of animals to a more favourable environment. It is common in mammals (*e.g.* porpoises), fish (*e.g.* eels and salmon) and some insects but is most marked in birds. The arctic tern, for example, migrates annually from its breeding ground in the Arctic circle to the Antarctic. Salmon usually migrate from marine to fresh water to spawn. The siberian crane, breeds in arctic Russia in Ykutia and western Siberia. It is a long distant migrant. Salamander is an amphibian with slender body, short legs and long tail. Outside the breeding season they are seldom seen as they spend most of their time underground.

64. (d) : The term metamerism refers to a linear repetition of parts in an animal body. It occurs in three highly organized phyla : Annelida, Arthropoda and Chordata. Each segment is called a metamere, or somite. Segmentation often affects both external and internal structures. Such a condition is called metameric segmentation. In chordates, the segmentation is apparent only in the embryonic stage. In the adult chordates, segmentation is visible in the internal structures, such as vertebrae, ribs, nerves and blood vessels. Other animals have unsegmented bodies.

65. (d) : Mollusca includes those animals which have soft bodies, usually furnished with a shell. The body is often divided into a head, with eyes or tentacles, a muscular foot and a visceral mass housing the organs. *Loligo* (squid or sea arrow), *Teredo* (shipworm), *Octopus* are some of their examples.

In option (a) *Spongilla* and *Euplectella* belong to porifera but *Pennatula* (the sea pen or sea feather) belongs to coelenterata. In option (b) *Physalia* and *Aurelia* belong to cnidaria but *Bonellia* belongs to Phylum Annelida. In option (c) *Planaria* and *Schistosoma* belong to platyhelminthes but *Enterobius* (Pinworm) belongs to aschelminthes.

66. (b) : Protista is the kingdom of unicellular eukaryotes. The protists include heterotrophs, autotrophs, and some organisms that can vary their nutritional mode depending upon environmental conditions. Protists occur in freshwater, saltwater, soil, and as symbionts within other organisms. *Trypanosoma*, *Noctiluca*, *Monocystis* and *Giardia* are all unicellular protists.

67. (a) : Platyhelminthes do not have body cavity so they are acoelomates. In annelids, the body cavity is true and schizocoelous. Both annelids and platyhelminthes have bilateral symmertry.

68. (a) : Prawn has one pair of antennae, one on either side, just below the antennules. They are sensory, excretory and balancing in function. Antennules are attached on either side, below the bases of eye stalks. They are tactile in function. Nematocysts are present in cnidoblasts that act as organs of offence and defence. Millipedes belong to class myriapoda. They are called thousand leggers because of possession of numerous walking legs. Body is made up of small head and 40 trunk segments, each with two pairs of jointed legs. Animals belonging to phylum porifera are mostly marine and a few are freshwater.

69. (c)

70. (c) : Mammals have twelve pair of cranial nerves. Ten pairs of cranial nerves are present in fish and amphibians. Reptiles and birds also have 12 pairs of cranial nerves.

71. (a) : Body in arthropoda is segmented. Segments are grouped into 3 forms - head, thorax and abdomen. When head and thorax are fused then they are referred to as cephalothorax. Class Insecta of Phylum Arthropoda have body divided into head, thorax and abdomen.

72. (d) : Echinoderms are triploblastic animals with organ system level of organisation. Larval forms possess bilateral symmetry while adults have radial symmetry.

73. (d) : It is universally accepted that amphibians (frogs) have originated from fishes. Resemblance of amphibia to fish is seen in most systems of the body. Both are cold blooded. Fish respire by gills and also tadpole of frog respires by gills. To prevent dessication in air, both usually lay eggs in water.

74. (c) : Uricotelism means excretion of uric acid. Uric acid excretion occurs in organisms which develop in an enclosed egg (where water is severely limited) or which normally experience very dry terrestrial environment as adult organisms. Uric acid is discharged as thick paste or as solid pellet: Examples: terrestrial reptiles, birds, insects, gastropod mollusc, etc.

75. (b) : The unique feature of mammals is the presence of diaphragm. It is a membrane that separates thoracic cavity from abdominal cavity. The cavity of other animals is not divided into thoracic and abdominal cavities. Homeothermy, four chambered heart and rib cage are the characters of mammals as well as some other animals also.

76. (d) : *Amoeba* is a fresh water protozoan containing contractile vacuole that is meant for osmoregulation. When *Amoeba* is placed in a marine water, then the water from the contractile vacuole will move out resulting in decrease in size of it. Contractile vacuole will increase in size if it is placed in hypotonic solution. Water will enter into contractile vacuole, thus increasing its size and ultimately it will burst and disappear.

77. (c) : Bartholin's glands are situated on either side of vagina in human females. These glands secrete a fluid that lubricates the vulva during copulation.

78. (a) : *Amoeba* forms a cyst and reproduces by multiple fission, during adverse environmental conditions. The animal secretes a three-layered, protective, chitinous cyst around it and becomes inactive. Inside the cyst, the nucleus repeatedly divides to form several daughter nuclei, which arrange themselves near the periphery. Each daughter nucleus becomes enveloped by a small amount of cytoplasm, thus forming a daughter amoeba, called amoebula or pseudopodiospore. When favourable conditions arrive, the cyst breaks off liberating the young pseudopodiospores, each with fine pseudopodia. They feed and grow rapidly to become adults and lead an independent life.

79. (c) : Systemic heart refers to the entire heart of lower vertebrates. This heart pumps blood to body parts and not the lungs.

80. (b) : *Sycon,* belonging to the Phylum Porifera, are multicellular organisms with cellular level of body organisation. The constituent cells perform their functions more or less independently. No distinct tissue or organs are present in it.

81. (d) : Life cycle of *F.hepatica* is complete and completed in two hosts. Primary host, in which the adult fluke lives, is sheep. While the intermediate host, in which numerous larval stages are passed, is a snail (*Lymnaea*, *Planorbis*, etc.). This type of life cycle, involving two different kinds of hosts, is termed digenetic.

Miracidium larva is the larval stage involved in life cycle. When suitable conditions become available, the encapsulated embryo, in 4-15 days, differentiates into a miracidium larva. It hatches out and swims in water. Metacercaria develops into adult fluke only inside its definitive host or sheep. The latter gets infection by grazing on leaves and grass blades to which the cysts are attached. Metacercaria survives action of host's gastric juice as its cyst is insoluble in it. Cyst wall finally dissolves in proximal part of intestine and liberates the larva.

82. (a) : In cockroach, the compound eyes are a pair of large, black, kidney-shaped organs situated dorsolaterally on the head, one on either side. Their surface is marked by a large number of hexagonal areas, the facets. Each facet represents a visual unit named ommatidium. The eyes are the organs of sight (photoreception).

83. (b) : In *Musca*, development is indirect with complete metamorphosis (holometaboly) including four stages as follows - egg, larva, pupa and adult.

In complete metamorphosis, larva after hatching, moults several times to become a fully grown one. It later becomes a pupa within a secreted case, called the puparium. Pupa differentiates into the young adult that breaks the puparium open and emerges outside. Then it grows to a mature form.

84. (b) : Silver fish is an insect in which respiration occurs by tracheae. These communicate with the exterior by paired apertures, called spiracles. Respiratory system of scorpion consists of 4 pairs of book lungs that communicate with the outer air through stigma. In sea squirt, respiration occurs through pharyngeal slits. In dolphin, respiration occurs by lungs.

85. (d) : *Hydra* which belongs to the phylum coelenterata has nerve cells but no brain. Its nervous system consists of nerve cells and their processes. Sensory cells are also present. Sponges do not have nerve cells, they lack nervous system. Earthworm (annelida) has nervous system consisting of a circumenteric nerve ring and a solid, double, midventral nerve cord with ganglia. Cockroach (arthropoda) has the nervous system as that of earthworm.

86. (d) : Dimorphic nucleus means two types of nuclei are present in *P. caudatum* – large macronucleus and small micronucleus. The macronucleus is roughly kidney-shaped and with inconspicuous nuclear membrane. Macronucleus is the somatic or vegetative nucleus and controls the day-to-day metabolic activities of the cell. The micronucleus is lodged in a depression on the surface of the macronucleus. It is usually spherical, with a nuclear membrane and with diploid number of chromosomes. It controls the reproductive activities of the organism. *Amoeba*, *Trypanosoma* and *Plasmodium* have only one nucleus.

87. (a) : Chordates are the animals that have notochord, a skeletal rod present at some stage in life cycle. In lower vertebrates, notochord persists throughout life while in higher vertebrates it is replaced by vertebral column in adults. Nonchordates never develop notochord, not even in embryonic stage.

88. (a) : The function of contractile vacuole is osmoregulatory. Water in freshwater protozoa enters the organism by endosmosis and during feeding. If the organism does not possess a mechanism to get rid of this excess water, it will swell to the point of rupture and dissolution. The mechanism which is assumed to effect water regulation is the contractile vacuole. The vacuole periodically increases in volume (diastole) to get filled with water and contracts (systole) to discharge its water content to the surrounding environment.

89. (d) : In molluscs, blood often has a copper-containing, blue respiratory pigment called haemocyanin. In insects, the blood called haemolymph is colourless. In echinodermates, blood is colourless as it has no respiratory pigment. In annelids, the blood is red with haemoglobin dissolved in plasma.

90. (d) : Snakes are limbless reptiles with elongated cylindrical body, covered with overlapping scales differentiated into shields and plates and have post anal tail which is long.

91. (c) : In *Hydra* indigestible residues are egested through mouth, for there is no anus. Egestion occurs by a sudden squirt due to muscular contraction of body, so that the debris is thrown at a distance. *Hydra* has neither blood and blood vessels, nor organs of excretion. Due to thinness of body wall and circulation of water in gastrovascular cavity, most cells of body remain freely exposed to the surrounding water. Therefore, excretion of waste nitrogenous matter (chiefly ammonia) occurs directly by diffusion through cell membranes in the outside world.

92. (b) : Cleavage in mammals is holoblastic unequal. Mammals have microlecithal eggs so they have holoblastic cleavage in which the segmentation lines pass through the entire egg, dividing it completely. As the eggs are microlecithal so one would expect that first cleavage will produce two equal blastomeres. But, this is not the case. The two blastomeres produced are unequal which divide further to form 4 unequal blastomeres and this process continues to form a ball of cells called morula. Superficial cleavage occurs in insects and discoidal cleavage occurs in birds.

93. (b) : *Hydra*, has tissue level of organization. Its body is multicellular and the cells occur in 2 distinct layers or tissues of specialized cells. Sponges have cellular level of organization. Liver fluke and *Ascaris* have organ-system level of organization.

94. (a) : Sexual dimorphism is the difference in the form of individuals of different sexes but of same species. Sexes in *Ascaris* are separate and sexual dimorphism is well defined. Males are smaller than females. They possess a recurved tail with pre and post anal papillae, a cloaca, and a pair of spicules or penial setae. In *Anopheles*, the ends of maxillary palps in males are club-shaped while in females they are not.

95. (a) : Main component of bone is collagen which is a complex combination of amino acids. When frog's bone is treated with HCl, these compounds are broken down and the bone becomes flexible.

96. (a) : Diaphragm is a membrane that separates thoracic cavity from abdominal cavity. It is present only in mammals. All other chordates do not have diaphragm as their body cavity is not divided into thoracic and abdominal cavities. Chordates are coelomate animals having a true coelom, entercoelic and shizocoelic in origin. Pharyngeal gill slits are present at some stage, may or may not be functional. Nerve cord is dorsal and tubular.

97. (a) : Mammals are viviparous *i.e.*, they give birth to young ones. Protherians (*e.g.*, *Platypus*) are primitive mammals and lay eggs, so they are oviparous.

98. (b) : The waste material of aquatic reptiles chiefly consists of urea, so they are ureotelic. Land forms are uricotelic *i.e.*, their water material consists of uric acid.

99. (a) : Poikilothermic animals are those whose body temperature varies with the temperature of the environment. All animals except birds and mammals are poikilothermic. Although unable to maintain a constant body temperature, they can respond to compensate for very low or very high temperatures. For example, the tissue composition (especially cell osmotic pressure) can change to regulate the blood flow to peripheral tissues (and thus increase heat loss or heat absorption), and the animals can actively seek sun or shade.

Homoiothermic animals are those whose body temperature remains constant irrespective of the variations in the temperature of the environment.

100. (b)

101. (d) : Forelimbs are absent in birds as they are modified into wings for flight. They are attached high on the back, to the anterior or thoracic region of the trunk, and are very powerful when compared with the size and strength of the bird. Each wing is elongated, flattened and distally pointed with its longitudinal axis at right angles to that of the trunk. Hindlimb is made of three parts - thigh, shank and foot. Pectoral girdle on each side consists of three bones - a large coracoid, scapula and clavicle. Pelvic girdle consists of ilium, ischium and pubis.

102. (c) : Aves are the animals that fly so their body weight should be less and for this their bones are hollow and connected by air passages. Reptilia, land vertebrates and mammals do not have hollow bones.

103. (b) : Solenocytes are also called flame cells. It is a cup shaped cell, which contains group of cilia and this is the main excretory organ of platyhelminthes.

104. (c) : *Obelia* belongs to the Phylum Coelenterata. In *Obelia*, life-cycle includes two clearly defined phases : a fixed polypoid phase (hydroid colony) and a pelagic medusoid phase. Hydroid colony has no gonads and reproduces by asexual budding to give rise to medusae. On the other hand, medusae reproduce exclusively by sexual method (ova and sperms) to give rise to new hydroid colonies. This fact apparently seems to have given rise to the idea of alternation of generations, also called metagenesis.

105. (a) : Dentary is a membrane bone, present in the lower jaw of the vertebrates, that supports the teeth. In mammals the dentary is the sole bone of the lower jaw. The dentary bone is relativley short comma shaped bone.

106. (c) : The connective tissue in between the seminiferous tubules of the testis contains special interstitial cells or cells of Leydig. They secrete the male sex hormones (androgens) such as testosterone. It stimulates secondary sexual characteristics of the male such as the enlargement of the external genitals and accessory glands.

107. (c) : Silver fish, scorpion, crab and honey bee all have compound eyes. These are present on each lateral side of the head and are convex. This eye consists of numerous visual units, the ommatidia. Each ommatidium consists of an outer cuticle covering a lens, beneath which are 6-8 retinal cells surrounding a light sensitive rhabdom. Adjacent ommatidia are separated by pigment cells.

108. (b) : The embryonated egg of *Ascaris* represents an egg with a juvenile. In case of *Ascaris*, the eggs containing the second stage of juvenile are called embryonated egg. These are infective to human host. In suitable conditions of temperature and moisture these eggs can survive for 5 to 6 years in the soil.

109. (b) : Sponges may have calcareous or siliceous spicules. All sponges are not marine, some are freshwater living also. Sponges may be asymmetrical or bilaterally symmetrical, besides being radially symmetrical. So, these characters are with exception. The character without exception is the regenerative power of sponges.

All sponges have a good power of regeneration. They can regrow any part of the body lost or cut off. Small fragments can grow into a complete sponge.

110. (d) : Gynandromorph (hermaphrodite) is an animal that possesses both male and female characteristics. For example, earthworm.

111. (c) : Coelom is a fluid-filled cavity that forms the main body cavity of vertebrate and most invertebrate animals. It is found between mesoderm and body wall (endoderm).

112. (c) : Pneumatic bone is present in pigeon to keep the bones light weight because the pigeon has to fly. Pneumatic bone has a hollow cavity, which makes it light.

113. (b) : Analogous organs are organs of very disparate organisms and are superficially similar but have evolved from vastly different origins. They have same function but different structure. The nephridia in earthworm are analogous to flame cells of *Planaria* since both of them have excretory functions. Nematoblasts of *Hydra* are organs of locomotion, food capture and anchorage. Gills and trachea are organs of respiration in prawn and insects respectively.

114. (a) : Mammals do not undergo moulting. Moulting is usually exhibited by invertebrates. In many vertebrate species, cervical vertebrae are variable in number, however almost all mammals have seven cervical vertebrae including those with short neck such as elephants or whales and those with very long necks, such as giraffes. But there are a few exceptional cases in which there are nine cervical vertebrae in mammals. All the mammals are not carnivorous, they may be herbivorous, carnivorous and omnivorous also. Mammals have dorsal nerve cord.

115. (d) : The body wall of sponges encloses a large cavity, the spongocoel and in most cases also contains in its thickness numerous small cavities, the canals. Either the spongocoel or certain canals are lined by choanocytes with flagella. The ceaseless beating of flagella maintains a steady current of water through the canals in the sponge body. The current of water enters through small pores, the dermal ostia, perforating the porocytes and, after passing through various canals, enters the spongocoel, and finally leaves through a larger aperture, the osculum, or apertures, the oscula.

All the cavities in a sponge body are inter-communicating, and are collectively referred to as the canal system. The current of water that flows through the canal system brings in food and oxygen, and carries away carbon dioxide and nitrogenous waste materials. Thus, the canal system helps the sponge in nutrition, respiration and excretion.

116. (a) : *Euglena* possesses the characteristics of both plant and animal. It has chlorophyll, thus it is autotrophic like plants. In contrast to this, it has flagellated locomotion like animals.

117. (d) : *Refer to answer 64.*

118. (a) : *Refer to answer 88.*

119. (c) : The organisms attached to the substratum possess radial symmetry in all vertical planes. All the animals belonging to cnidaria (*e.g.* jellyfish) and echinodermata (*e.g.* starfish) are radially symmetrical and typically sessile in their adult form. In radial symmetry the parts in an organ or organism when cut through the centre in any direction produces two halves that are mirror images of each other.

120. (c) : Sympathetic nervous system forms a part of autonomic nervous system that consists of nerves which connect the visceral receptors and effectors with the central nervous system through the crania and spinal nerves. Sympathetic nerves arise from thoracolumbar nerves.

121. (b) : Oestrous cycle comprises cyclic changes in female reproductive system of non-primate mammals like cows, dogs, etc. The oestrous cycle consists of a short period of oestrous or 'heat' (*e.g.*, 18 hours in cow) followed by the rest of period of anoestrous or 'passive'. During oestrous, the female receives the male for copulation. During anoestrus, the female becomes passive and does not receive the male. Although the break down of tissues takes place in the female reproductive tract at the end of an oestrous cycle, yet there is no menstruation.

122. (d) : The sub-phylum vertebrata or craniata have a well developed central nervous system that is differentiated into brain and spinal cord. Brain is protected by a brain box called cranium, so they are also called as craniata.

123. (d) : The cells characteristic of the coelenterates include stinging cells (cnidocytes or cnidoblasts or nematoblasts) for offence and defence. The stinging cells, when discharged, give out from a sac, the cnide or cnidocyst or nematocyst, a long thread-tube that may coil around the prey, or attach to it, or inject a toxin, called hypnotoxin, into it to paralyse it.

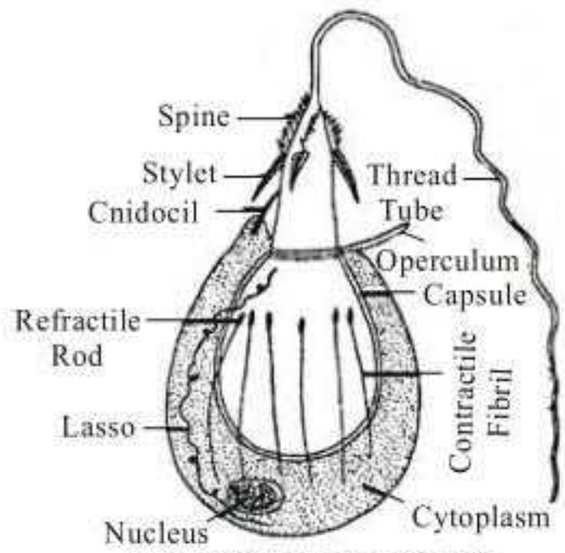


Fig. : Cnidoblast discharged.

124. (a) : *Refer to answer 119.*

125. (b) : Platyhelminthes have soft and dorsoventrally flattened body with bilateral symmetry. *Plasmodium* and *Trypanosoma* belong to Phylum Protozoa while *Wuchereria* belongs to Phylum Aschelminthes.

126. (c) : Sea anemone is completely non-parasitic form. It shows the example of mutualism. Sea-anemone attaches itself to shell used by a hermit crab. The anemone obtains nourishment from the scraps of food left by the crab, and is transported from place to place when the crab moves. The crab is protected by the stinging cells in the tentacles of sea anemone. Mosquito and leech are parasites of animals and feed on their blood. Tapeworm is a human gut parasite.

127. (a) : Starfish belongs to the phylum echinodermata who have developed tube feet for locomotion. The tube feet generally protrude out through special radial areas called ambulacra. They are extended and retracted by variations in hydraulic pressure of fluid in them and by contractions of their muscles.

Cuttle fish belongs to the Phylum Mollusca and it swims. Crayfish belongs to the Phylum Arthropoda in which locomotion occurs by jointed appendages. Jelly fish belongs to the Phylum Cnidaria and it swims.

128. (a) : Birds and lizards are uricotelic. Uricotelic animals are those that excrete nitrogenous waste in the form of uric acid. It is being insoluble in water, does not require water for its elimination. Frogs and cartilaginous fish are ureotelic, that is they excrete nitrogenous waste in the form of urea. The main excretory matter of insects is uric acid and of bony fish is ammonia (ammoniotelic). Molluscs may be ammoniotelic or uricotelic. Mammals are ureotelic (excretory matter is urea).

129. (d) : Air passes from the external nares into the nasal cavity where the dust particles are trapped. From nasal cavity, the air moves into pharynx which is a short, vertical tube. It further leads into two tubes, trachea and oesophagus. Larynx is the upper part of trachea. Besides forming a part of the respiratory tract, it also serves as the voice box. Trachea is a thin walled tube that extends downward through the neck. It divides into two primary bronchi which on entering the lungs divide into fine branches called bronchioles which enter the alveoli. Exchange of gases occur in alveoli.

130. (a) : In the open circulatory system, the blood is not confined to the blood vessels, but it flows in the open spaces. Prawn, *Chelifer* and cockroach have open circulatory system. Frog's tadpole has closed circulatory system, that is the blood flows in the blood vessels.

131. (c) : The ostrich is a flightless bird native to Africa. It is the only living species of its family. It is distinctive in its appearance, with a long neck and legs and the ability to run at speeds of about 65 km/h (40 mph), the top land speed of any bird. Penguins are a group of aquatic, flightless birds living almost exclusively in the Southern Hemisphere. A kiwi is any of the species of small flightless birds endemic to New Zealand.

132. (d) : The looping or crawling movement in *Hirudinaria* is performed with the help of muscles and suckers which serve for attachment.

133. (c) : The beef tapeworm *Taenia saginata* is similar to the pork tapeworm *Taenia solium*, in structure and life history. It is the commonest tapeworm of man with a much greater incidence than that of *T. solium*. Scolex bears four strong, rounded, adhesive suckers but lacks hooks and rostellum.

134. (a) : *Hydra* possesses a very primitive type of nervous system. It includes bipolar and multipolar nerve cells or neurones lying immediately above the muscle processes and forming an irregular and discontinuous nerve net or nerve plexus.

Neighbouring nerve cells are not fused together, but their processes or neurites form synaptic junctions. Such a nerve net is called a synaptic nerve net. Nerve cells are numerous around mouth and on pedal disc but show no groupings in the form of a nerve controlling centre like brain or nerve ring. A difference from higher animals is that the nerve net of *Hydra* is unpolarized so that impulses can pass in all directions (diffuse transmission). In brief, nerve net shows diffuse unpolarized transmission, autonomy of parts and paucity of reflexes.

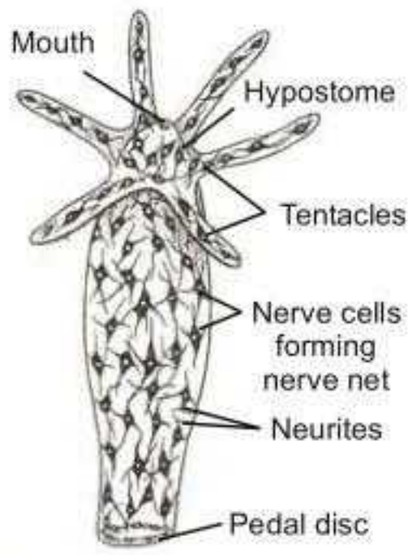


Fig. : Nerve net in *Hydra*.

135. (b) : Budding is an asexual mode of reproduction in *Hydra* and sponges. Bud is formed as an outgrowth on the body surface, then detached to form new animal.

136.(b) : Tracheae act as passage of air during respiration in both cockroach and mammals. In cockroach, the cuticular lining is spirally thickened forming taenidia which prevents the tracheal tubes from collapsing. In mammals, cartilaginous rings supporting the walls of the tracheae prevent their collapsing.

137. (d) : In butterfly, the larval stage is known as catterpillar, in frog is known as tadpole and in mosquito is known as wriggler.

138. (d) : Gorilla, chimpanzee, monkeys and humans belong to the same order *i.e.*, primates. They have well developed brain, flat nails on fingers and toes. First digit is usually opposable, an adaptation for grasping. Eyes are typically large and turned forward.

139. (b) : Whale, bat and rat are mammals. Diaphragm is present in mammals. The diaphragm separates the thoracic cavity (with lung and heart) from the abdominal cavity (with digestive system and urogenital system). In its relaxed state, the diaphragm is shaped like a dome. It is controlled by the phrenic nerve.

140. (a) : The common Indian bull frog *Rana tigrina* lives in or near permanent freshwater lakes, ponds and streams. It is in the water most of the time. It lives near water mainly for two reasons : (i) To keep skin moist to carry on cutaneous respiration, and (ii) To immediately jump or slip into water to escape from enemies.

141. (a) : Aristotle's lantern occurs in the Class Echinoidea. Five teeth surrounding the mouth are attached to a masticatory apparatus, called Aristotle's lantern, after its discoverer and because of its resemblance to an ancient Greek ship-lantern. It is situated within the test and projects slightly through the mouth. It consists of five large calcareous plates, called pyramids or alveoli. By means of special protractor and retractor muscles the lantern can be partially protracted and retracted through the mouth. Aristotle's lantern is used in feeding.

142. (a) : Starfishes belong to Class Asteroidea, characterized by the presence of five or more arms not sharply set off from a central disc. They are free-living marine animals that occur on sandy or muddy bottoms or crawl about over rocks and shells. All are carnivorous, feeding mainly on crustaceans, polychaetes and molluscs. They also feed on detritus and plankton. They are in general, exhibit remarkable powers of autotomy and regeneration.

143. (d) : In cephalopoda paired eyes are large, efficient and bulge from the dorso-lateral sides of the head. They bear striking resemblance to those of a vertebrate in that a cornea, iris, lens and retina are present. Lens projects an inverted image on the retina, as in the vertebrate eye. External muscle attachments enable limited movements of the eye. But the embryological development of the cephalopod eye is entirely different from that of the vertebrate eye, so that homologically they are different, for the vertebrate eye is formed as an outgrowth of the brain, while the cephalopod eye is formed by an ectodermal invagination.

144. (b) : Two common mosquito genera, *Anopheles* and *Culex* can be easily identified by their sitting postures. When sitting, the abdomen of *Anopheles* is always held at an angle to the surface while that of *Culex* is held parallel to the surface.

145. (c) : At the posterior end or base of the trachea, at its junction with the bronchi, is found a special structure, the syrinx or voice box, concerned with sound production. It is characteristic of birds as it does not occur in other vertebrates.

146. (d) : Cockroaches are found in places where there is warmth, dampness and plenty of organic food to devour. Indoors, they are a common pest in kitchens, latrines, hotels, restaurants, godowns, storerooms, board ships, etc.

Cockroaches are nocturnal creatures. During daytime, they remain inactive and hiding. During night, they show much activity and run here and there in search of food. Being omnivorous and scavengerous in diet, they devour any animal or vegetable substance and even non-living materials like leather, paper, cloth, etc., causing great loss.

147. (b) : In *Ascaris*, rhabditiform larva of first stage is not infective. In a week's time, it moults within the egg shell and becomes the second stage rhabditoid, which is capable of infecting the host. Cysticercus, hexacanth and onchosphere are the larval stages of *Taenia*.

148. (d) : There are about 450 mature proglottids forming the middle part of strobila. These are large and squarish in outline. The anterior 100 to 150 proglottids contain only male reproductive organs, while the posterior 250 mature proglottids develop both male and female reproductive organs making them hermaphrodite.

149. (a) : Sponges belong to the Phylum Porifera. Ostia, spongocoel and osculum together form a canal system which is characteristic of all sponges. Canal system of *Leucosolenia* is of ascon type. It is the simplest type of canal system found in sponges. Water enters directly through ostia into the central spongocoel, which is lined by choanocytes, and leaves through osculum. Sycon type of canal system is found *Sycon* and Leucon type is found in *Spongilla*. There is no canal system named as radial type.

150. (b) : *Refer to answer 14.*

151. (b) : Kidney of adult rabbit is metanephros. It is formed from the posterior end of the nephrogenic mesoderm which is displaced somewhat anteriorly and laterally.

152. (b) : Homoeostasis is the regulation by an organism of the chemical composition of its body fluids and other aspects of its internal environment so that physiological processes can proceed at optimum rates. It involves monitoring changes in the external and internal environment by means of receptors and adjusting the composition of the body fluids accordingly; excretion and osmoregulation are important in this process. Example of homeostatic regulation are the maintenance of the acid-base balance and body temperature.

153. (b) : Radial symmetry is the arrangement of parts in an organ or organism such that cutting through the centre of the structure in any direction produces two halves that are mirror images of each other. All animals belonging to the cnidaria (*e.g.*, jellyfish) and echinodermata (*e.g.*, starfish) are radially symmetrical.

154. (c) : *Musca* is the zoological name of house fly which is regarded as mechanical carrier of many diseases. It is very active and keeps on visiting on dirty things and eatables as well.

155. (c) : Ecdysone is a steroid hormone, secreted by a pair of prothoracic glands in the thorax of insects and by Y-organs in crustaceans, that stimulates moulting and metamorphosis. In insects its release is stimulated by prothoracicotropic hormone.

156. (b) : The Phylum Porifera is divided into three classes : calcarea or calcispongiae, hexactinellida or hyalospongiae and demospongiae or sclerospongiae, on the basis of spicules (skeleton). Class Calcarea have calcareous spicules, Class Hexactinellida have siliceous spicules and Class Demospongiae have siliceous spicules or spongin fibres or both.

157. (a) : Flame cells are scattered throughout parenchyma from which they remove metabolic wastes. A flame cell is of irregular shape, with granular cytoplasm and a nucleus. Bundle of cilia, or flame, arises from basal granules near nucleus. Cilia are enclosed into a funnel-shaped lumen formed by the terminal blind end of a capillary. Protonephridia are found in flatworms, Malpighian tubules in insects and green glands in crustaceans.

158. (a) : Cysticercus is the larval stage of tapeworm which is characterised by a large vesicle and one scolex. Cysticercus develops in adult tapeworm only when ingested by the human host. In pig's body it leads quite an inactive life and remains viable for several years, after which it dies and becomes calcified. Pork (pig's flesh) containing viable cysticerci is called measly pork for its spotted appearance.

159. (a) : The stratum corneum ("the horny layer") is the outermost layer of the epidermis (the outermost layer of the skin). It is composed mainly off dead cells that lack nuclei. In reptiles, the stratum corneum is permanent, and is only replaced during times of rapid growth, in a process called ecdysis or moulting. During ecdysis, small fragments of this layer are periodically shed of from the body. The new layer is regularly formed by underlying stratum germinativum.

160. (b) : Penguins are a group of aquatic, flightless birds living almost exclusively in Antarctica. All penguins are countershaded - that is, they have a white underside and a dark (mostly black) upperside. This is for camouflage.

161. (c) : Visceral leishmaniasis, also known as kala-azar and black fever, is the most severe form of leishmaniasis, a disease caused by parasites of the *Leishmania* genus.It is transmitted by sand fly. The adult female sand fly is a bloodsucker, usually feeding at night on sleeping prey. When the fly bites an animal infected with *L. donovani*, the pathogen is ingested along with the prey's blood.

Leishmania tropica produces skin ulcers known as oriental sore or Delhi sore. The disease is spread by sand flies. The parasite lives in the endothelial cells of skin capillaries. It leads to ulcerated wounds with raised edges. They do not cause much pain.

162. (a) : In insects Malpighian tubules are attached to the alimentary canal at the extreme anterior end of hindgut. These are fine, long, unbranched, yellowish and blind tubules lying freely in the haemolymph. These are between 60 to 150 in number and are arranged in 6-8 bundles. These excrete out nitrogenous wastes from the body in the form of uric acid.

163. (a) : The beef tapeworm *Taenia saginata* is similar to the pork tapeworm *Taenia solium*, in structure and life history. It is the commonest tapeworm of man with a much greater incidence than that of *T. solium*. Its intermediate hosts are cattle and buffaloes. It is longer than *T.solium*, usually attaining a length upto 12 meters or more. Scolex bears four strong, rounded, adhesive suckers but lacks hooks. Strobila comprises up to 2,000 proglottids. A gravid proglottid contains about 100,000 eggs. Uterus of gravid proglottids has 15 to 35 branches on either side.

164. (c)

165. (b) : Eutheria is a taxon containing the placental mammals, such as humans. Nevertheless, all Eutherians are placental mammals. This means that a Eutherian foetus is nourished during gestation by a placenta. Eutherians are also viviparous, meaning that the offspring are carried in the mother's womb until fully developed.

166. (d) : The wishbone, known in anatomy as the furcula, is a sternum bone found in birds which is shaped like the letter Y. It is used as an attachment point for the wing muscles. It is so named because of a tradition: Two people pull on each side of such a bone, and when it breaks, the one who gets the larger part is said to have a wish granted. Two clavicles fused with inter clavicle to form a fork shaped bone called wish bone.

167. (b) : In birds, the pectoral and supracoracoideus muscles that power the wings are anchored to a large bony keel along the midline of the sternum.

168. (c) : The diagnostic characters of chordates are notochord, dorsal hollow nerve cord, pharyngeal slits and post anal tail. Tail is the part of the body behind the cloacal or anal opening. It contains skeletal elements, muscles, blood vessels and nerves but no viscera. It provides much of propulsive force in aquatic species. The tail is reduced or absent in the adults of some chordates.

169. (a) : Earthworms are very useful. All over the world they are used as bait for fishing. Earthworms are in general beneficial to agriculture. Their habit of burrowing and swallowing earth increases fertility of soil in many ways. Their burrows permit penetration of air and moisture in porous soil, improve drainage, and make easier the downward growth of roots. Excretory wastes and other secretions of worms also enrich soil by adding nitrogenous matters that form important plant food. Earthworms were used variously as medicines in the past. Earthworms were used to cure stones in bladder, yellowness of jaundice, pyorrhoea, piles, rheumatism or gout, diarrhoea. Earthworms are easily obtained and are of convenient size for dissections. They are, therefore, universally employed for class studies and for investigations in general and comparative physiology.

170. (a) : Eggs of *Taenia* undergo cleavage to form morula. Morula, at its morphologically posterior end, develops three pairs of chitinous hooks secreted by differentiated cells, called onchoblasts. This six-hooked embryo, called hexacanth, possesses a pair of large penetration glands. It is surrounded by two hexacanth membranes. The hexacanth, together with all the membranes surrounding it, is known as onchosphere. The secondary or intermediate host acquires infection by ingesting the onchospheres. Pig, which regularly feeds on human excreta is the usual secondary host, but dog, monkey and sheep are also known to get the infection. Man himself may serve as the secondary host by ingesting onchospheres with inadequately cooked or raw vegetables.

171. (b) : Jelly fish belongs to the Class Scyphozoa of the Phylum Cnidaria. Its genus is *Aurelia*. *Aurelia* is found in the coastal waters of the tropical and temperate seas. *Aurelia* may float passively or swim

actively, singly or in shoals. It is carnivorous and unisexual. It has a soft, gelatinous, saucer-like body. Its margin bears numerous short tentacles and 8 sense organs, called rhopalia, in notches of the margin. Each sense organ is enclosed by a pair of leaf-like lappets. At the centre of the lower (subumbrellar) surface is the squarish mouth surrounded by 4 long oral arms.

172. (d) : *Gambusia* is a species of freshwater fish. It is remarkably hardy, surviving in waters of very low oxygen saturations, high salinities and high temperatures. For these reasons, this species may now be the most widespread freshwater fish in the world, having being introduced as a biocontrol in certain countries to control mosquitoes. It feeds on larval and pupal stages of mosquitoes.

173. (d) : Order Cetacea includes whales, dolphins and porpoises. These are the most highly modified mammals. They have a fish-like body with smooth, hairless skin devoid of sweat and oil glands, far posterior nares, small eyes, minute ear openings without pinnae, paddle-like forelimbs, no hindlimbs, abdominal testes and flattened tail ending in two horizontal flaps or flukes.

174. (b) : Bird vertebrae are heterocoelous *i.e.*, the centra of vertebrae have saddle - shaped ends. Acoelous refers to vertebrae that are flat on both ends (mammals). Amphicoelous means both ends of the centrum are concave (fish). Procoelous means concave in front and convex in back (anurans and reptiles).

175. (a) : Hindlimbs are variously modified for various functions like perching, grasping etc. In the kingfisher they are modified for wading. The legs and toes are exceptionally long and slender and serve to walk over aquatic vegetation or marshes.

176. (c) : Pigeons are noted for their unique ability to produce "pigeon's milk", a soft, cheesy and nourishing secretion, especially during the breeding season. It is formed by the degeneration of the epithelial cells lining the crop. It is regurgitated into the mouth of the young birds until they are old enough to manage a grain-diet like their parents. The pigeon's milk includes water, fat, protein (casein) and lactose. The milk is produced by both sexes and contains 35 per cent of fat.

177. (c) : *Typhlops* is a genus of blind snakes (non-poisonous snake) found in Europe, Africa, Asia and Central and South America. Sea snake is a poisonous snake while grass snake is a non-poisonous snake. Glass snake is a lizard.

178. (c) : *Necturus* is a mud puppy belonging to the Order Urodela of Class Amphibia. Hell bender is a large salamander. *Amphiuma* is a Congo Eel and *Ichthyophis* is a blind worm.

179. (b) : The fire-bellied toads is a group of eight species of small toads belonging to the genus *Bombina*. They are found across much of Europe and Asia, staying in water or near the shore. Their name derives from the brightly coloured red or yellow and black patterns on their ventral region, which act as warning to its predators. *Amphiuma* is a Congo-eel. *Necturus* is a mud puppy and *Salamandra* is a salamander.

180. (c) : Tortoise belongs to the Class Reptilia. Its body is protected by a shell consisting of a dorsal carapace and ventral plastron.

181. (b) : The common name of *Teredo* is shipworm which belongs to the class bivalvia of the Phylum Mollusca. In it, head is absent and foot is wedge - shaped for burrowing. Shell consists of two valves. The common name of *Chiton* is the coat of mail shell (Class Amphineura), *Limax* is the grey slug (Class Gastropoda) and *Patella* is true limpet (Class Gastropoda).

182. (a) : The mulberry silk moth has been the most commercially important beneficial insect. The silk is obtained by killing the pupa inside the hot water.Then, the silk thread is wound.

183. (a) : The common name of *Tubipora* is Organ Pipe Coral. It is a marine animal of the Class Anthozoa (Phylum Cnidaria). It occurs on reefs in shallow waters of the Indian and Pacific oceans and is characterized by long, parallel upright polyps or stalks, supported by a skeleton of rigid tubes of calcium carbonate.