

Animal Kingdom

Multiple Choice Questions (MCQs)

Q. 1 In some animal groups, the body is found divided into compartments with at least some organs. This characteristic feature is called

- (a) Segmentation (b) Metamerism
(c) Metagenesis (d) Metamorphosis

💡 Thinking Process

Compartmentalisation of body of multicellular organisms is an evolutionary advancement over lower group of animals. Various kinds of organisms show these features.

Ans. (b) Metamerism is the division of animal body, externally and internally into segments with a serial repetition of at least some organism, e.g., annelids (earthworm).

However, **Segmentation** refers to the division of animal's body into a series of repetitive segments. It is external in arthropods, and internal in vertebrates.

Metagenesis is the phenomenon in which one generation of certain animals and plants reproduces asexually, followed by a sexually reproducing generation, i.e., alternation of generation (e.g., *Obelia*).

Metamorphosis is the developmental process in an organism through which it changes from one life form to another (e.g., Order–Lepidoptera–Butterfly egg–larvae–pupa–adult).

Q. 2 Given below are types of cells present in some animals. Which of the following cells can differentiate to perform different functions?

- (a) choanocytes (b) interstitial cells
(c) gastrodermal cells (d) nematocytes

Ans. (b) Interstitial cells are the totipotent cells in the body of cnidarians that are capable of giving rise to any kind of specialised cells to perform different functions.

Choanocytes or collar cells are associated with filtering nutrients in sponges.

Gastrodermal cells or the cnidocyst are used in attachment and defence in cnidarians.

Nematocyst are capsules that are the specialised cells in cnidarians, acting as a paralysing sting and used for defence purpose.

Q. 3 Which one of the following sets of animals share a four chambered heart?

- (a) Amphibian, Reptiles, Birds (b) Crocodiles, Birds, Mammals
(c) Crocodiles, Lizards, Turtles (d) Lizards, Mammals, Birds

Ans. (b) Crocodiles, birds, mammals have four-chambered heart.

Heart is usually three chambered in reptiles with an exception crocodiles, which possess four chambered heart. The division in their heart is due to the incomplete interventricular septum, in ventricles.

Heart in **birds** and **mammals** is four chambered and there is a complete division of interventricular septum in ventricles. Whereas, **amphibians** possess a three chambered heart in which the ventricle are not divided hence, 2 atria and one ventricle is present.

Q. 4 Which of the following pairs of animals has non-glandular skin?

- (a) Snake and frog (b) *Chameleon* and turtle
(c) Frog and pigeon (d) Crocodile and tiger

💡 Thinking Process

Skin is the soft outer covering in vertebrates. This is made up of more than one layer of cells. In some organisms, the epidermal cells possess certain modifications which help in protecting the organs against harsh environment.

Ans. (b) *Chameleon* and turtle belong to class-Reptilia and possess dry and non-glandular skin with scales,

Frog, pigeon and tiger possess modifications in their skin according to adaptations in their respective habitats.

Q. 5 Birds and mammals share one of the following characteristics as a common feature.

- (a) Pigmented skin
(b) Pneumatic bones
(c) Viviparity
(d) Warm blooded body

Ans. (d) Warm blooded animals can maintain constant body temperature, irrespective of the surrounding environment, *i.e.*, their body temperature is fixed. Warm blooded body is the common characteristic feature in birds and mammals. This characteristic was first evolved in higher reptiles, birds and mammals acquire this feature from higher reptiles during evolution.

Pigmented skin is the adaptive feature in mammals, and is not present in birds. Pneumatic bones are found only in birds as their flight adaptation. These reduce body weight for flight. **Viviparity** is shown by mammals and not by birds as they are oviparous, *i.e.* lay eggs.

Q. 6 Which one of the following sets of animals belong to a single taxonomic group?

- (a) Cuttlefish, jellyfish, silverfish, dogfish, starfish
(b) bat, pigeon, butterfly
(c) Monkey, chimpanzee, man
(d) Silkworm, tapeworm, earthworm

Ans. (c) Monkey, chimpanzee and man belong to a single taxonomic group, *i.e.*, mammals because all of them possess the following characters.

- (i) Milk producing mammary glands.
- (ii) Two pairs of limbs.
- (iii) Presence of external ears.
- (iv) Viviparity.
- (v) Skin possessing hair.

Whereas,

Animal Group	Taxonomic Group
Cuttle fish	Phylum–Mollusca, Class–Cephalopoda,
Jelly fish	Phylum–Cnidaria
Silver fish	Class–Insecta, Order–Thysanura, Phylum–Arthropoda,
Dog fish	Phylum–Chordata, Class–Chondrithyes,
Starfish	Phylum–Echinodermata, Class–Asteroidea,

Animal Group	Taxonomic Group
Bat	Phylum–Chordata, Class–Mammalia
Pigeon	Phylum–Chordata, Class Aves
Butterfly	Phylum–Arthropoda, Class–Insecta, Order–Lepidoptera

Animal Group	Taxonomic Group
Silkworm	Phylum–Arthropoda, Class–Insecta, Order–Lepidoptera
Tapeworm	Phylum–Platyhelminthes, Class–Cestoda
Earthworm	Phylum–Annelida, Class–Oligochaeta

Q. 7 Which one of the following statements is incorrect?

- (a) Mesoglea is present in between ectoderm and endoderm in *Obelia*
- (b) *Asterias* exhibits radial symmetry an
- (c) *Fasciola* is a pseudocoelomate animal
- (d) *Taenia* is a triploblastic animal

Ans. (c) The statement, *Fasciola* is a pseudocoelomate animals, is incorrect as it does not possess body cavity hence, it is an acoelomate.

Mesoglea is an undifferentiated layer and is a characteristic of diploblastic and triploblastic animals present along with ectoderm and endoderm.

Symmetry in which the body can be divided into two equal identical halves from any plane passing through the central axis. as shown by *Asterias*, is called radial symmetry

Taenia is a triploblastic animal, it possesses three germinal layers, *i.e.*, ectoderm, endoderm and mesoderm.

Q. 8 Which one of the following statements is incorrect?

- (a) In cockroaches and prawns excretion of waste material occurs through Malpighian tubules.
- (b) In ctenophores, locomotion is mediated by comb plates.
- (c) In *Fasciola* flame cells take part in excretion
- (d) Earthworms are hermaphrodites and yet cross fertilisation take place among them.

💡 Thinking Process

Malpighian tubules are the blind end tubules that arise at junctions of midgut and hindgut and are excretory in function. Green glands are a pair of excretory organs in some crustaceans, that open at the base of each antennae.

Ans. (a) The statement (a) is incorrect because Malpighian tubules are excretory structures in most of the insects, including **cockroach**, but green glands perform excretory functions in **crustaceans** like **prawns**, whereas all the other statements are true.

Q. 9 Which one of the following is oviparous?

- (a) Platypus
- (b) Flying fox (bat)
- (c) Elephant
- (d) Whale

Ans. (a) Platypus is a primitive mammal which shows many characters of their reptilian descent, such as oviparity, *i.e.*, these lay eggs.

Rest all three animals, *i.e.*, flying fox, elephant and whale are viviparous mammals and giving birth to young ones.

Q. 10 Which one of the following is not a poisonous snake?

- (a) Cobra
- (b) Viper
- (c) Python
- (d) Krait

💡 Thinking Process

Poison in snakes is a highly modified form of saliva, which, contains zootoxins (toxin of animal origin), which may cause the immobilisation and killing of prey. It also defends snakes from any threat.

Ans. (c) **Except Python**, all other snakes are highly poisonous in nature. Python due is large in size and kills its prey by constriction of their body.

Q. 11 Match the following list of animals with their level of organisation.

Division of Labour	Animal
(i) Organ level	A. <i>Pheretima</i>
(ii) Cellular aggregate level	B. <i>Fasciola</i>
(iii) Tissue level	C. <i>Spongilla</i>
(iv) Organ system level	D. <i>Obelia</i>

Choose the correct match showing division of labour with animal example.

- (a) (i)-B, (ii)-C, (iii)-D and (iv)-A
- (b) (i)-B, (ii)-D, (iii)-C and (iv)-A
- (c) (i)-D, (ii)-A, (iii)-B and (iv)-C
- (d) (i)-A, (ii)-D, (iii)-C and (iv)-B

Ans. (c) (i)-D, (ii) - A, (iii)-B, (iv) - C

Pheretima possesses organ system level of organisation.

Fasciola possesses organ level organisation.

Spongilla possesses cellular aggregate level organisation.

Obelia possesses tissue level organisation.

Q.12 Body cavity is the cavity present between body wall and gut wall. In some animals the body cavity is not lined by mesoderm. Such animals are called.

- (a) Acoelomate (b) Pseudocoelomate
(c) Coelomate (d) Haemocoelomate

Thinking Process

Germ layer gives rise to all the organs and tissue of the fully formed individual. On the basis of germ layer, animals can be divided as

- (i) **Diploblastic** Body cells are arranged in two layers, outer ectoderm and internal endoderm with mesoglea.
(ii) **Triploblastic** Three germ layers i.e., ectoderm, mesoderm and endoderm, gives rise to different tissues, organ and organ system of an organism.

Ans. (b) When body cavity is not completely lined by the mesoderm instead it is present in the form of scattered pouches, in between ectoderm and endoderm, this type of body cavity called pseudocoelomate, e.g., roundworm.

Acoelomates the animals in which coelom is completely absent as, e.g., flatworms.

Coelomates have their body cavity lined by mesoderm and hence have true coelom, e.g., annelids, molluscs, arthropods, etc.

Haemocoelomates are the animals in which body cavity is filled with haemolymph, e.g., arthropods, molluscs.

Q. 13 Match the column I with column II and choose the correct option.

Column I	Column II
A. Porifera	1. Canal system
B. Aschelminthes	2. Water vascular system
C. Annelida	3. Muscular Pharynx
D. Arthropoda	4. Jointed appendages
E. Echinodermata	5. Metameres

Codes

	A	B	C	D	E
(a)	2	3	5	4	1
(b)	2	5	3	4	1
(c)	1	3	5	4	2
(d)	1	5	3	4	2

Ans. (c) The body of porifera (sponges) is organised in such a way, so that they form a complex system of pores and canals called canal system. This system helps in regulating the flow of water within them e.g., *Sycon*.

Aschelminthes possess jointed appendages e.g., *Ascaris*.

Annelidans possess metameric, segmentation in body e.g., earthworm.

Arthropodans possess jointed appendages in each segment of their body e.g., cockroach.

Echinoderms possess water vascular system or ambulacral system e.g., *Asterias* or starfish.

Very Short Answer Type Questions

Q. 1 Identify the phylum in which adults exhibit radial symmetry and larva exhibit bilateral symmetry.

Ans. **Symmetry** is an attribute of an organism showing regularity in body parts on a plane or around an axis.

In **Phylum Echinodermata**, the adult echinoderms are radially symmetrical but the larvae are **bilaterally symmetrical**.

Q. 2 What is the importance of pneumatic bones and air sacs in Aves?

Ans. Birds possess light weight bones that contain internal spaces filled with air. These are called pneumatic bones. They help in, reducing their body weight, thus is an adaptation for flight.

Aerodynamic lungs with specialised air sacs provides an additional feature and gives adaptability to birds to fly (e.g., bald eagle, pigeon).

Q. 3 What is metagenesis? Mention an example which exhibits this phenomenon.

Ans. **Metagenesis** is the phenomenon in which one generation of certain plants and animals reproduce asexually, followed by the sexually reproducing generation. Both the forms are diploid in metagenesis hence, it is the false alternation of generation.

Coelenterates exhibits **metagenesis** (e.g., *Obelia*) where polyp form alternates with medusa in its life cycle.

Q. 4 What is the role of feathers?

Ans. Feathers are the epidermal growth that forms distinctive outer covering or plumage in birds.

Feathers play a variety of roles like

- (i) They help in creating airfoil shape for wings so, as to provide lift and help in flight.
- (ii) Feathers helps in maintaining body temperature.
- (iii) Feathers play a vital role in mating by providing secondary sex characters in both the sexes the colour and markings determine the attractiveness of mate.

Q. 5 Which group of chordates possess sucking and circular mouth without jaws?

Ans. Class–Cyclostomata is comprised of, the living jawless fishes. Their mouth is circular and lack jaws, hence they are also called agnathans. It works like a sucker and is surrounded by tentacles (e.g., lampreys and hagfish). These also possess retractable horny teeth.

Q. 6 Give one example each for an animal possessing placoid scales and that with cycloid scales.

Ans. Fishes possess dermal scales, each scale made of dentine that is secreted by dermal papilla. Placoid scales are hard and microscopic in size, their body is made up of dentine and exposed surface is covered with enamel, Cycloid scales are strong and extremely flexible.

They are large, oval and made up of isopeptine (layer of collagenous fibre). Placoid Scales are the characteristic features of cartilaginous fishes. (e.g., *Scoliodon*). Whereas, cycloid scale are found in bony fishes (e.g., *Catla catla*).

Q. 7 Mention two modifications in reptiles required for terrestrial mode of life.

Ans. There are certain characters acquired by reptiles for the terrestrial adaptations.
Two of them are

- (i) Their body is covered by dry and cornified skin and epidermal scales or scutes.
- (ii) Fertilisation is internal.

Q. 8 Mention one example each for animals with chitinous exoskeleton and those covered by a calcareous shell.

Ans. Every living form maintain a proper shape, size and structure. In multicellular lower organisms the shape of body is maintained by certain biological materials like **chitin** and **calcium substances**. **Chitinous exoskeleton** is the characteristic feature of arthropods. (e.g., cockroach, termite, wasp) whereas, **calcareous shell** is present in molluscs (gastropods). (e.g., snail and slugs).

Q. 9 What is the role of radula in molluscs?

Ans. The radula is a special rasping structure found in many **molluscs**. It is used to scrape and scratch the food and to create depressions in rocks which molluscs use as their habitat.

The radula bears many rows of tiny teeth that are replaced as they wear down. e.g., *Limpet* is a marine invertebrate that uses its radula for creating home by boring a shallow hole in the rock.

Q. 10 Name the animal, which exhibits the phenomenon of bioluminescence. Mention the phylum to which it belongs.

Ans. The phenomenon of production and emission of light by an organism as a result of chemical reaction during which chemical energy is converted to light energy is called **bioluminescence**.

Ctenoplana from phylum–Ctenophora, exhibits the phenomenon of bioluminescence.

Q. 11 Write one example for each of the following in the space provided.

- (a) Cold blooded animal
- (b) Warm blooded animal
- (c) Animal possessing dry and cornified skin
- (d) Dioecious animal

Ans. (a) *Crocodilus* (crocodile) is a cold blooded animal.
(b) *Elephas maximus* (elephant), (mammal) is warm blooded animal.
(c) *Testudo* (tortoise) bears dry and cornified skin.
(d) *Ascaris* (roundworm) is a dioecious animal.

Q. 12 Differentiate between a diploblastic and a triploblastic animal.

Ans. Animals in which the cells are arranged in two embryonic layers, an external ectoderm and an internal endoderm are called diploblastic animals (e.g., coelentrates). While those animals in which the developing embryo has a third germinal layer, i.e., **mesoderm** lying between the **ectoderm** and **endoderm** are called **triploblastic** animals. (e.g., chordates).

Q. 13 Give an example of the following

- (a) Roundworm
- (b) Fish possessing poison sting
- (c) A limbless reptile/amphibian
- (d) An oviparous mammal

Ans. (a) Roundworm – *Ascaris*
 (b) Fish possessing poison sting – *Trygon*
 (c) A limbless reptile/amphibian – *Ichthyophis*
 (d) An oviparous mammal – **Duck billed platypus.**

Q. 14 Provide appropriate technical term in the space provided.

- (a) Blood-filled cavity in arthropods
- (b) Free-floating form of cnidaria
- (c) Stinging organ of jelly fishes
- (d) Lateral appendages in aquatic annelids

Ans. (a) **Haemocoel** is the blood-filled cavity in arthropods containing haemolymph.
 (b) **Medusa** is a form in cnidarians in which the body is shaped **like an umbrella** which can float freely in sed water
 (c) **Nematocytes** are capsules of specialised cells **in cnidarians** which act as a paralysing sting.
 (d) **Parapodia** are the paired unjointed lateral outgrowth in annelids bearing chaetae.

Q. 15 Match the following.

Animals	Locomotory Organ
A. <i>Octopus</i>	(i) Limbs
B. Crocodile	(ii) Comb plates
C. <i>Catta</i>	(iii) Tentacles
D. <i>Ctenoplana</i>	(iv) Fins

Ans. A. → (iii) B. → (i) C. → (iv) D. → (ii)

- (a) **Octopus** Tentacles are the appendages in invertebrates that are used for grasping food and for locomotion.
- (b) **Crocodile** Limbs are used for locomotion, and swimming.
- (c) **Catta** Fins Fins are means of locomotion and are used to generate optimum thrust thus controlling the subsequent motion.
- (d) **Ctenoplana** Comb plates are locomotory organs formed by strong cilia with fused bases.

Short Answer Type Questions

Q. 1 Differentiate between

- Open circulatory system and closed circulatory system.
- Oviparous and viviparous characteristic .
- Direct development and Indirect development.

Ans. *Differentiation between these are as below*

(a) Open Circulatory System	Closed Circulatory System
In this type of circulation, blood flows in spaces called sinuses and the cells and tissues are directly bathed in it. <i>e.g.,</i> arthropods (grasshopper, cockroach), gastropods (snail).	In this type of circulation, blood is circulated <i>via</i> a series of vessels (arteries, veins and capillaries). <i>e.g.,</i> annelids (earthworm) and vertebrates (birds, primates etc).
(b) Oviparous characteristics Animals	Viviparous Characteristic Animals
Oviparity is expulsion of undeveloped eggs rather than live young ones Animals that lay eggs are called oviparous. <i>e.g.,</i> fishes, reptiles, amphibians, birds, insects and monotremes (mammals that lay eggs).	Viviparity is retention and growth of fertilised egg within the maternal body until the young one is capable of independent existence. Animals which give birth to their young ones and are called viviparous animals. <i>e.g.,</i> mammals.
(c) Direct Development	Indirect Development
Direct development is the type of development in which there is no larval/nymphal or other intermediate stages in life cycle between the egg (or birth) and the adult (<i>e.g.,</i> mammals)	Indirect development is mostly observed in lower animals. The adult individuals lay eggs, which develop passing into the adult after passing through few to several larval nymphal stages. (<i>e.g.,</i> echinoderms, arthropods)

Q. 2 Sort out the animals on the basis of their symmetry (radial or bilateral) coelenterates, ctenophores, annelids, arthropods and echinoderms.

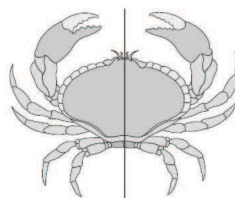
Ans. Body symmetry is the similarity of body parts in different region and directions of the body plan.

In radial symmetry, body of an individual can be divided into equal halves by any planes passing through the longitudinal axis. (*e.g.,* Coelenterates, Ctenophores, Echinoderms).

In bilateral symmetry, body can be divided into two equal halves when the plane passes through the median longitudinal or saggital axis. (*e.g.,* Annelids, Arthropods)



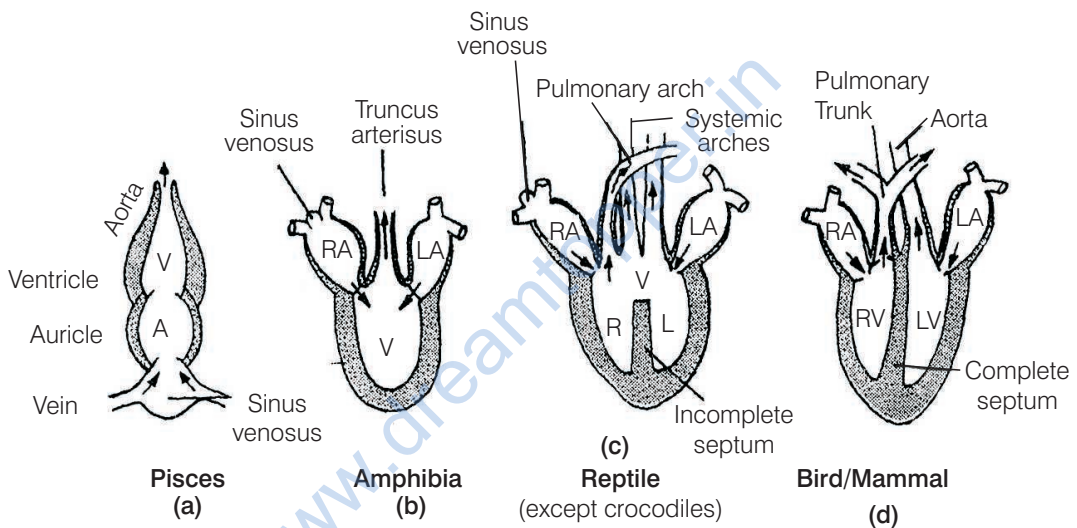
Radial symmetry



Bilateral symmetry

Q. 3 There has been an increase in the number of chambers in heart during evolution of vertebrates. Give the names of the class of vertebrates having two, three or four chambered heart.

- Ans.** (a) **Two chambered heart** is present in organisms like fishes. Only one atria and one ventricle is present which are not separated and hence mixing of oxygenated and deoxygenated blood occurs.
- (b) **Three chambered heart** develops after the division of auricle into right and left halves as in amphibian. Mixing of oxygenated and deoxygenated blood occurs in ventricles.
- (c) **An intermediary heart** is present in reptiles in which ventricle get partially divided through a septum which is incomplete. e.g., Crocodiles, thus having four-chambered heart.
- (d) **In four chambered heart** both the auricle and ventricle are divided into two halves and thus no mixing of oxygenated and deoxygenated blood occurs. e.g., birds and mammals.



(a) 2 chambered heart, (b) and (c) 3 chambered heart, (d) 4 chambered heart

Q. 4 Fill up the blank spaces appropriately

Phylum/Class	Excretory Organ	Circulatory Organ	Respiratory Organ
Arthropoda	Nephridia	Closed	Lungs/Gills/ Tracheal System
	Metanephridia	Open	Skin/Parapodia
Amphibia		Closed	Lung

Ans. Excretion involves the elimination of metabolic waste products from the animal body.

Different organs are involved in the process of excretion in different animals.

- (a) **In Arthropods**, the Malpighian tubules remove excretory products from haemolymph.
- (b) **In Annelids**, the excretory organ occurs as segmentally arranged coiled tubules called nephridia
- (c) **In Molluscas**, excretion occurs by paired structures called organ of Bojanus also called metanephridia.
- (d) **In Amphibians mesonephric** kidneys are associated with excretion.

Blood circulation involves the circulation of blood and lymph along with oxygen, carbondioxide, hormones, blood cells, etc, within the body system for the nourishment of cells, fighting diseases, and for stabilising body temperature and pH.

Open Circulation	Closed Circulation
In this, blood is pumped out of the heart into sinuses which directly open into cells and tissues, e.g., phylum–Arthropoda, and Mollusca.	In this system, blood is circulated through a series of complexly arranged vessels and capillaries e.g., phylum–Annelida and Class–Amphibia.

Respiratory organs are involved in the exchange of gases from the atmosphere.

Different respiratory organs are as follows

- Lungs/gills/tracheal system in arthropoda and molluscs.
- Skin in annelids.
- Lungs and skin in amphibians.

Q. 5 Match the following

A. Amphibia	(i) Air bladder
B. Mammals	(ii) Cartilaginous notochord
C. Chondrichthyes	(iii) Mammary glands
D. Osteichthyes	(iv) Pneumatic bones
E. Cyclostomata	(v) Dual habitat
F. Aves	(vi) Sucking and circular mouth with out jaws.

Ans. A. → (v) B. → (iii) C. → (ii) D. → (i) E. → (vi) F. → (iv)

- Amphibians** possess **dual habitat**, i.e., they are found in both aquatic and terrestrial habitat. Their larva is completely aquatic and adult lives in terrestrial as well as in aquatic habitat
- Mammals** have **mammary glands** which produce milk and feed their young ones. The mammary glands are enlarged exocrine modified sweat glands functional in female mammals.
- Chondrichthyes** have the **cartilaginous rod** (notochord) in the young stage which is gradually replaced by cartilage.
- Osteichthyes** have **air bladder** which is a vesicle or sac containing air,
- Cyclostomes** possess **sucking** and **circular mouth** without jaws which is surrounded by tentacles and the tongue bears teeth. e.g., lamprey and nagfish.
- Aves** have light weighted bones with internal spaces filled with air called pneumatic bones and aerodynamic lungs with specialised air sacs. These are the adaptations which enable birds to fly.

Q. 6 Endoparasites are found inside the host body. Mention the special structure, possessed by these and which enables them to survive in those conditions.

Ans. The endoparasites such as *Taenia solium* and *Fasciola hepatica* (liver fluke), etc., are found inside the host body, and survive due to the presence of certain characters.

Special characters present in by endoparasites are as follows

- (i) They possess anaerobic respiration and the gaseous exchange is through general body surface.
- (ii) These organisms bear additional organ for the attachment to the host. *Fasciola hepatica* possesses acetabulum or posterior sucker for the attachment. *Taenia solium* possesses hooks and suckers for the attachment with the host.
- (iii) Reproductive organs are well developed. They are generally, hermaphrodite and self fertilisation is common in them.
- (iv) The thick tegument (body covering) is present which is resistant to the host's digestive enzymes and antitoxins.
- (v) Absence of locomotory organs.
- (vi) Tapeworms lack digestive organs because digested and semidigested food of the host is directly absorbed through their body surface.

Q. 7 Match the following and write correct choice in space provided

Animal	Characteristics
A. <i>Pila</i>	(i) Jointed appendages
B. Cockroach	(ii) Perching
C. <i>Asterias</i>	(iii) Water vascular system
D. <i>Torpedo</i>	(iv) Electric organ
E. Parrot	(v) Presence of shell
F. Dog fish	(vi) Placoid scales

- A. B.
 C. D.
 E. F.

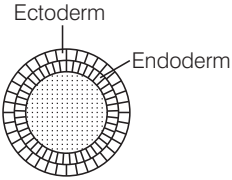
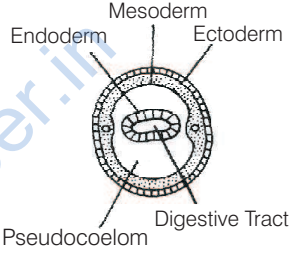


Ans. A. → (v) B. → (ii) C. → (iii) D. → (iv) E. → (ii) F. → (vi)

- A. ***Pila*-Presence of shell** Shell in *Pila* is an elongated structure which consists of a tubular whorl coiled around a central axis called columella. The main function of shell is to provide protection from harsh conditions.
- B. **Cockroach-Jointed appendages** Presence of jointed appendages along with segmented body is the characteristic feature of arthropods (e.g., spiders, bees, crabs etc).
- C. ***Asterias*-Water vascular system** It is the unique and characteristic feature in echinoderms. This system acts as a hydraulic system, composed of canals connecting numerous tube feet. It is very important as it helps *Asterias* (sea star) to move as well as to catch food. Respiration also takes place, through, water vascular system.
- D. ***Torpedo* Electric organ.** *Torpedos* are unique organisms, having two large kidney shaped electric organs. These organs are capable of generating high voltage electric shocks.
- E. **Parrot-Perching** Birds with the feet adapted (to hold tree branches) are perching birds. The *Passeriform* birds are true **perching birds** with four toes, three directed forward and one backward.
- F. **Dog fish-Placoid scales** Placoid scales are tough scales that cover the skin of elasmobranchs (dog fish, sharks and rays). They are covered with hard enamel. The function of these scales is to protect against predators.

Q. 8 Differentiate between

- (a) Open and closed circulatory system
- (b) Oviparity and viviparity
- (c) Direct and indirect development
- (d) Acoelomate and pseudocoelomate
- (e) Notochord and nerve cord
- (f) Polyp and medusa

Ans. For (a), (b) and (c) refer to Q. 1

(d) Acoelomate	Pseudocoelomate
<p>The animals without coelom are called as acoelomates e.g., sponges, cnidarians, ctenophores and flatworms.</p>  <p style="text-align: center;">Acoelomate body plan</p>	<p>The animals in which body cavity is derived from the blastocoel of the embryo are called pseudocoelomates. e.g., roundworms.</p>  <p style="text-align: center;">Pseudocoelomate body plan</p>
(e) Notochord	Nerve Cord
<p>Notochord is the skeletal rod which lies lengthwise between the central nervous system and the alimentary canal or the gut. Vertebrates possess it at the young stage of development. It is a part of skeleton system In adults vertebrates, notochord is replaced by vertebral column.</p>	<p>Nerve cord is the solid strand of nervous tissue forming a part of central nervous system, especially in invertebrates.</p>
(f) Polyp	Medusa
<p>Polyp is sessile and cylindrical form in <i>Aurelia</i>. Polyp produces medusa asexually</p>  <p style="text-align: center;">Polyp in Aurelia</p>	<p>Medusa is umbrella shaped and free swimming form in <i>Aurelia</i>. Medusa forms polyp sexually.</p>  <p style="text-align: center;">Medusa in Aurelia</p>

Q. 9 Give the characteristic features of the following citing one example of each

- (a) Chondrichthyes and ostichthyes
- (b) Urochordata and cephalochordata

Ans. Characteristic features of different classes mentioned are as follows

(a) **Chondrichthyes**

- (i) These are marine animals with a stream lined body.
- (ii) Body is has cartilaginous exoskeleton and the skin is tough due to the presence of minute placoid scales.
- (iii) These animals are predaceous.
- (iv) Due to the absence of air bladder they have to swim constantly to avoid sinking.
- (v) They are cold blooded animals e.g., *Scoliodon* (dog fish), *Pristis* (saw fish).
- (vi) Some of them possess electric organs and poison sting (*Torpedo* and *Trygon*).

Osteichthyes

- (i) These animals are found in both habitats, i.e., marine and freshwater. They bear bony endoskeleton.
- (ii) Body is streamlined, possesses four pairs of gills covered by an operculum, on each side.
- (iii) Skin is covered by cycloid or ctenoid scales.
- (iv) Presence of air bladder is an additional feature providing buoyancy to animal.
- (v) Heart is two chambered.
- (vi) Sexes are separate, fertilisation usually external, oviparous animal with direct development.
e.g., marine- *Exocoetus* (flying fish), *Hippocampus* (sea horse); freshwater- *Labeo* (rohu).

(b) **Urochordata**

- (i) In urochordates, notochord is only present in larval tail.
- (ii) They contain a tough outer covering called tunic.
- (iii) Persence of pharyngeal slits during some stage of the life cycle and a muscular, post anal tail is the characteristic features in urochordates.
e.g., *Salpa*, *Ascidia*, *Doliolum*.

Cephalochordata

- (i) Cephalochordates are exclusively marine animals.
- (ii) The notochord in cephalochordates extends, from the heart to tail region and is persistent throughout the life.
- (iii) Body-wall shows one cell thick, non-ciliated epidermis, connective tissue, striated muscle and parietal peritonium.
- (iv) Fertilisation is external
e.g., *Branchiostoma* (*Amphioxus* or *Lancelet*).

Q. 10 Mention two similarities between

- (a) Aves and mammals
- (b) A frog and crocodile
- (c) A turtle and *Pila*

Ans. (a) **Similarities between aves and mammals**

- (i) The members of both the groups are homeotherms, i.e., warm blooded. They are able to maintain constant body temperature.
- (ii) Heart is completely four chambered.

(b) Similarities between frog and crocodile

- (i) The members of both the groups are poikilotherms, *i.e.*, they lack the capacity to regulate their constant body temperature. They are cold blooded animals.
- (ii) Frog and crocodile are oviparous animals.

(c) Similarities between turtle and Pila

- (i) In both animals, body is covered with dry and cornified skin. In turtle, the epidermal covering is known as scales whereas in case of Pila, it is known as calcareous shell.
- (ii) Both animals are oviparous.

Q. 11 Name

- (a) A limbless animal
- (b) A cold blooded animal
- (c) A warm blooded animal
- (d) An animal possessing dry and cornified skin
- (e) An animal having canal system and spicules
- (f) An animal with cnidoblasts

- Ans. (a)** *Ichthyophis* does not possess limbs.
(b) *Scoliodon* (dog fish) is a cold blooded animal.
(c) *Columba* (pigeon) is a warm blooded animal.
(d) *Naja naja* (snake) possesses dry and cornified skin.
(e) *Sycon* (sponge) possesses canal system and bear spicules.
(f) *Obelia* bears cnidoblast.

Q. 12 Give an example for each of the following

- (a) A viviparous animal
- (b) A fish possessing a poison sting
- (c) A fish possessing an electric organ
- (d) An organ, which regulates buoyancy
- (e) Animal, which exhibits alternation of generation
- (f) Oviparous animal with mammary gland

- Ans. (a)** A viviparous animal is the one in which development of young ones is direct, later they provides nutrition to their offspring. It includes all mammals, except *Platypus*.
(b) A fish possessing a poison sting is *Trygon* (sting-ray). It is found on its tail. The poison released is strong enough to stun an animal.
(c) A fish possessing an electric organ *Torpedo* (electric ray). Electric organ in *Torpedo* is located in its big round pectoral fin which is just behind the eye. Large *Torpedo* can generate a fish killing current of up to 200 volts.
(d) An organ, which regulates buoyancy is air bladder present in class–Osteichthyes. (*e.g.*, *Exocoetus*, *Catla*).
(e) Animal exhibiting alteration of generation is *Aurelia* or jelly fish of phylum–Cnidaria. It has two basic body forms called polyp and medusa are present. Polyp is sessile and cylindrical whereas medusa is umbrella shaped and free swimming form. Polyp produces medusa asexually and medusa forms polyps sexually (*e.g.*, *Obelia*).
(f) Oviparous animal with mammary gland is *Ornithorhynchus* (duck-billed platypus). Duck bill platypus is the only mammal which lays egg and also bear mammary gland, which is a characteristic feature of mammals.

Q. 13 Excretory organs of different animals are given below. Choose correctly and write in the space provided.

Animal	Excretory Organ/Unit
A. Balanoglossus	(i) Metanephridia
B. Leech	(ii) Nephridia
C. Locust	(iii) Flame cells
D. Liver fluke	(iv) Absent
E. Sea urchin	(v) Malpighian tubule
F. Pila	(vi) Proboscis gland

- A.
 B.
 C.
 D.
 E.
 F.

💡 Thinking Process

Metabolism in body leads to the formation of waste that can affect body's vital organs so it has to be removed from body. Different classes of organisms possess different types of excretory organs to eliminate the byproduct of metabolism.

Ans. A. → (vi) **B.** → (ii) **C.** → (v) **D.** → (iii) **E.** → (vi) **F.** → (i)

- A. **Balanoglossus - Proboscis glands** This gland present in front of central sinus and excretes brown granules.
- B. **Leech Nephridia** It helps in osmoregulation and excretion.
- C. **Locust Malpighian tubules** These tubules open into gut and help in excretion.
- D. **Liver fluke Flame cells** They are specialised cells in Platyhelminthes which helps in osmoregulation and excretion. These are also called protonephridia.
- E. **Sea urchin-absent** Specialised excretory organs are absent in sea urchin.
- F. **Pila-Metanephridia** It is a type of excretory gland or nephridium found in many types of invertebrates such as annelids, arthropods, and molluscs (in molluscs nephridia is also known as Bojanus organ).

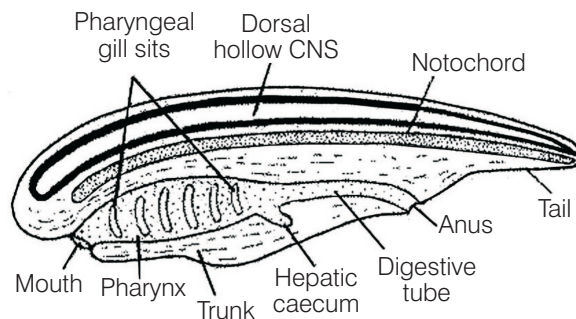
Long Answer Type Questions

Q. 1 Give three major differences between chordates and non chordates and draw a schematic sketch of a chordate showing those features.

Ans. The major differences between Chordates and Non-chordates are as follows

Chordates	Non-Chordates
1. A notochord is present at some stage in the life cycle of a chordate.	Notochord is not present at any stage in the life cycle of a non-chordate.
2. Gill-slits are present in the pharynx either in embryo or in adult organism.	Pharyngeal gill slits are absent.
3. Tail is present at some stage in the life of the chordate.	Tail is absent in non-chordates.
4. Heart is ventrally located.	Heart (if present) is dorsally located.
5. Central nervous system is dorsal and hollow in chordates.	Central nervous system in non-chordates is solid and ventrally located.

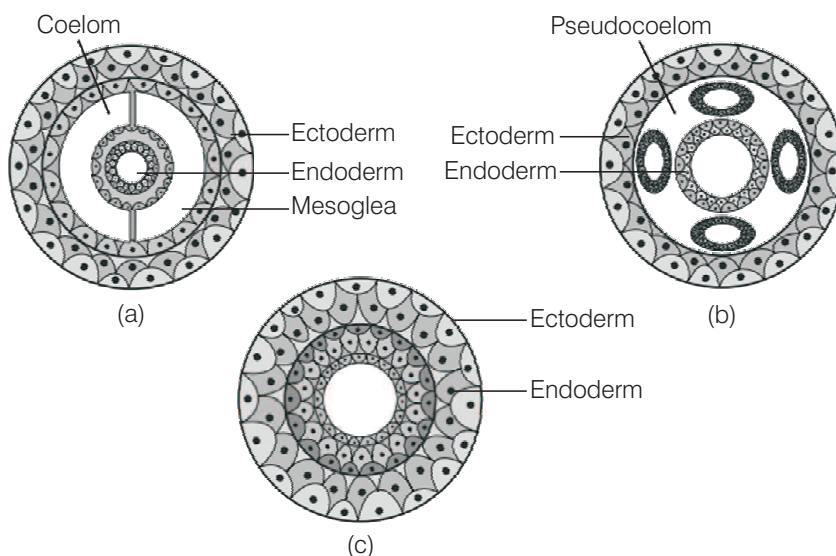
Schematic sketch illustrating important characters of chordates is shown below



Q. 2 What is the relationship between germinal layers and the formation of body cavity in case of coelomate, acoelomates and pseudocoelomates?

Ans. All adult multicellular organisms typically possess a concentric arrangement of tissues in the body. These tissues are derived from the three embryonic cell layers called **germinal layers**.

- (i) The outer layer is the **ectoderm**, the middle layer is the **mesoderm** and the innermost layer is the **endoderm**.
- (ii) Endoderm layer is associated with the formation of the stomach, colon, liver, pancreas, urinary bladder and other vital organs in an organism.
- (iii) Mesoderm forms the main structural components of the body like the skeletal muscles, the skeleton, the dermis of the skin connective tissue, etc.
- (iv) Ectoderm is associated with the formation of CNS, eye lens, ganglia, nerves and glands.
- (v) The body cavity that is lined by mesoderm is called coelom, and the animals possessing coelom are called as **coelomates**. e.g., phylum–Annelida, Mollusca, Arthropoda, Echinodermata, Hemichordata and Chordata.
- (vi) In some organisms, body cavity is not lined by mesoderm, instead mesoderm is present in the form of scattered pouches in between ectoderm and endoderm, Such body cavity is called **pseudocoelom** and animals possessing there stusturs are refered to as **pseudocoelomates** e.g., *Ascaris*.
- (vii) The animals in which there is complete absence of body cavity are called **acoelomates**. e.g., Platyhelminthes.

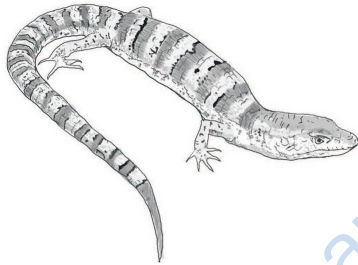


(a) Coelomate, (b) Pseudocoelomate and (c) Acoelomate

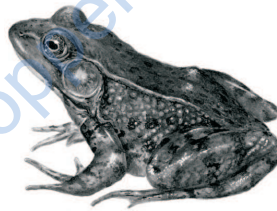
Q. 3 Comment upon the habitats and external features of animals belonging to class–Amphibia and Reptilia.

Ans. Amphibians

- (i) They possess dual life as they can live in aquatic as well as terrestrial habitat. They are ectothermic (cold blooded).
- (ii) They are tetrapods (4 limbs) which facilitate movement land.
- (iii) Their limbs are evolved from the pectoral and pelvic fins.
- (iv) Skin is thin, covered by mucus and mostly remain moist, also serves as an accessory source oxygen.
- (v) They are both gill and lung breathers; usually gills appear in th larval stage, replaced by lungs in the adults stage.
- (vi) They possess three chambered heart with two atria and one ventricle.
- (vii) The fertilisation is mostly external, females are oviparous.
- (viii) Larva is a tadpole, which metamorphosis into adult thus shaving metamorphosis. e.g., Rana frog, *Nectureus* (mud puppy), Salamandra (salamander).



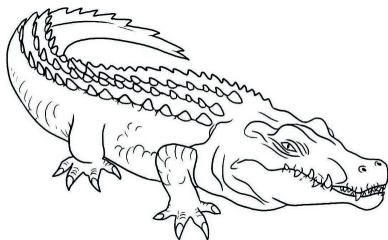
(a) *Salamandra*



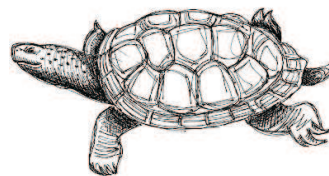
(b) Frog

Reptiles

- (i) In reptiles, creeping and crawling mode of locomotion is found.
- (ii) They are mostly terrestrial animals and their body is covered by dry, and cornified skin, epidermal scales or scutes.
- (iii) Lungs are well developed and present in all stages of life.
- (iv) Toes possess claws.
- (v) Appendages are well adapted for the movement on land.
- (vi) Heart possesses a partially divided ventricle and 2 atria.
- (vii) They lay amniotic eggs which are incubate on land.
- (viii) They are poikilothermic or cold blooded animals. Temperature is regulated mechanically and not metabolically by moving in and out; heat source is usually the sun.
- (ix) fertilisation is internal They are oviparous and development of young ones is direc. e.g., *Chelone* (turtle), *Naja* (cobra), *Crocodilus* (crocodile).



(a) *Crocodilus*



(b) *Chelone*

Q. 4 Mammals are most adapted among the vertebrates elaborate.

Ans. *Mammals are most adapted among the vertebrates and the following features explain the justify this statement.*

- (i) They are found in variety of habitats, *i.e.*, polar ice caps, deserts, mountains, forests, grasslands and dark caves.
- (ii) They have better developed brain. The brain bears large cerebellum and cerebrum.
- (iii) The most unique mammalian characteristic is the presence of milk producing glands (mammary glands) by which mammals nourish their young ones.
- (iv) Mammals are homeotherms (warm blooded), *i.e.*, they are capable of maintaining their body temperature regardless of to the surrounding environment.
- (v) They possess oil secreting glands (sebaceous glands) and sweat glands (sudoriferous glands) in the skin.
- (vi) They possess two pair of limbs, that are well adapted for walking, running, climbing, burrowing, swimming and flying.
- (vii) fertilisation is internal. They show viviparity with few exceptions *e.g.*, oviparous - *Ornithorhynchus* (platypus) and the development is direct. *e.g.*, viviparous - *Macropus* (kangaroo), *Rattus* (rat), *Canis* (dog), *Delphinus* (common dolphin), *Panthera tigris* (tiger), etc.