

Diversity In Living Organisms

PS Verma and V.K. Agarwal Biology Class 9 Page No – 253.

Solution SAQ – 1

- (a) Point Diversity – This is a diversity present on the smallest scale.
- (b) Alpha Diversity – Also known as local diversity and includes variety of organisms local to a particular habitat.
- (c) Gamma Diversity – It represents the diversity of a larger unit such as an island or a landscape.
- (d) Epsilon Diversity – It is also called regional diversity and includes total diversity of a group of gamma diversity areas.

Solution SAQ – 2

A single plant may be considered as a unit of alpha diversity; a leaf as an area of point diversity; a group of plants occurring together as an area of gamma diversity and the forest within which the plants are located as an area of epsilon diversity.

Solution SAQ – 3

Classification is essential to understand the inter-relationship among different groups of organisms.

Solution SAQ – 4

The basis of classification is to study the diversity among living organisms in an effective way.

Solution SAQ – 5

There are two broad categories of cell structure: Prokaryotic and Eukaryotic. Thus, two broad groups can be formed – one having prokaryotic cell structure and the other having eukaryotic cell structure.

Solution SAQ – 6

Seven categories of hierarchical classification are: Kingdom, Phylum, Class, Order, Family, Genus and Species.

Solution SAQ – 7

Features of plants:

- (a) The growth of plant body is often unlimited and continues till death.
- (b) The asexual reproduction or vegetative reproduction is common in the plants.

Features of animals:

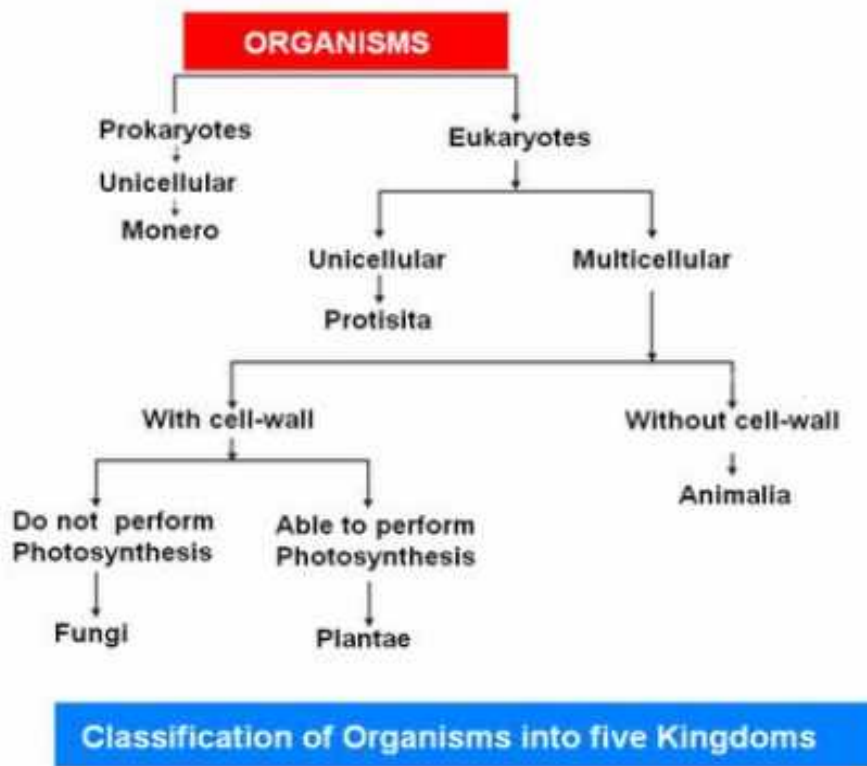
- (a) They have definite shape and size.
- (b) Animals have distinct excretory organs.

Solution SAQ – 8

The two kingdom system of classification was not found to be suitable to many scientists due to large diversity among the organisms and many other limitations. The main demerits of the system are –

- (i) Many protozoans possess characters of both plants and animals. For example, Euglena has animal characters but it contains chlorophyll.
- (ii) Bacteria and Cyanobacteria (blue-green algae) have many similarities between them and are quite different from other organisms. Thus, it is difficult to place them in their plant or animal kingdom.

Solution SAQ – 9:



Solution SAQ – 10:

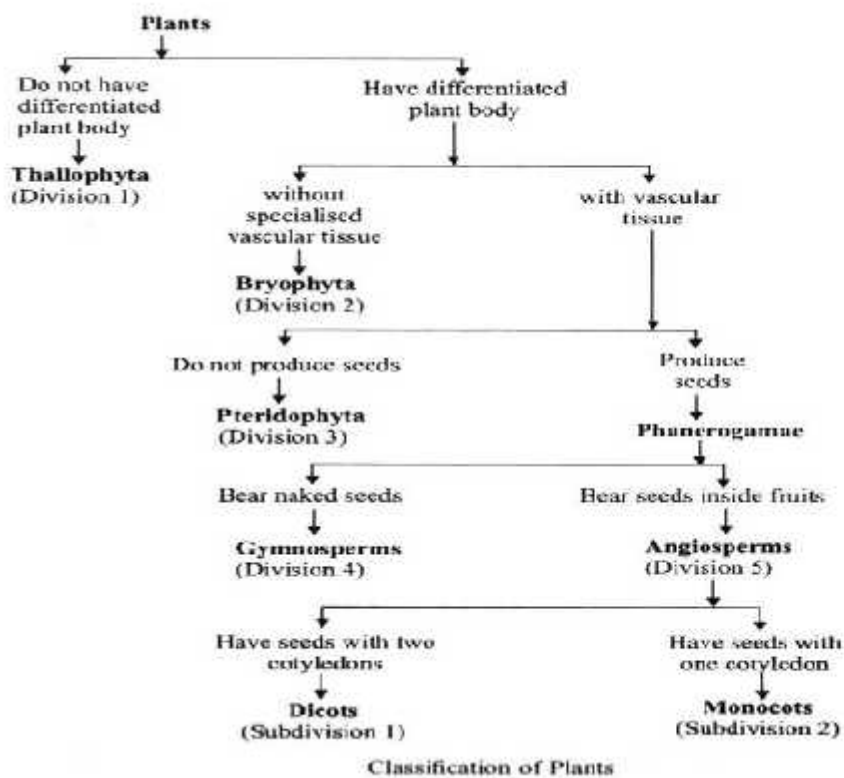
Two characteristics of Kingdom Protista are:

- (i) Some of the organisms use appendages, such as hair-like cilia or whip-like flagellum.
- (ii) Their mode of nutrition can be autotrophic or heterotrophic.

Solution SAQ – 11:

Lichens occur in hostile habitats such as barren rocks, walls, tree trunks and icy regions where they can be seen as slow growing large coloured patches. They are a source of essences, dhup, havan samagri, some medicines and dyes.

Solution SAQ – 12:



Solution SAQ – 13:

Four General characters of Thallophyta are:

- (i) It includes most primitive and simple plants.
- (ii) There is no vascular system.
- (iii) The reproductive organs are simple, single-celled.
- (iv) There is no embryo formation after fertilization.

Solution SAQ – 14:

Algae:

- (i) They contain photosynthetic pigments.
- (ii) Algae are autotrophic.
- (iii) The cell wall is made of cellulose

Fungi:

- (i) Photosynthetic pigments are absent in them.
- (ii) Fungi are heterotrophic.
- (iii) The cell wall is made of chitin

Solution SAQ – 16:

Dicots:

- (i) Leaves of these plants have reticulate venation.
- (ii) Secondary growth occurs.
- (iii) The plants have tap root system.

Monocots:

- (i) Leaves of these plants have parallel venation.
- (ii) Secondary growth does not occur.
- (iii) The plants have adventitious root system.

Solution SAQ – 17

Bryophyta:

- (i) Plant body is gametophytic.
- (ii) Real stem and leaves are always absent.
- (iii) Fixation of plant body is carried out by rhizoids.
- (iv) Bryophytes are non-vascular in nature.

Pteridophyta:

- (i) Plant body is sporophytic.
- (ii) Real stem and leaves are present.
- (iii) Fixation of plant body is carried out by roots.
- (iv) Pteridophytes are vascular plants.

Solution SAQ – 18:

- (i) Bryophytes are small multicellular green land plants. These simple land plants are confined to shady damp places.

- (ii) A true vascular system is absent in them.
- (iii) The sex organs are multicellular.
- (iv) An embryo is formed upon fertilisation.

Example: Riccia and Marchantia.

Solution SAQ – 19

- (i) They are found mainly in shady or damp places.
- (ii) The plant body is made up of root, stem and leaves.
- (iii) They have well developed vascular system (xylem and phloem) for the conduction of water and other substances, from one part of the plant body to another.
- (iv) These plants have no flowers and do not produce seeds.

Example: Club mosses – Selaginella and Ferns – Marselia.

Solution SAQ – 20

- (i) They are most primitive and simple seed plants.
- (ii) The seeds produced by these plants are naked and are not enclosed within fruits.
- (iii) They are usually perennial, evergreen and woody plants.
- (iv) Sporophylls are aggregated to form cones.

Solution SAQ – 21

- (i) Angiosperms are highly evolved plants.
- (ii) They produce seeds that are enclosed within the fruit.
- (iii) The reproductive organs (sporophylls) are aggregated in flower.
- (iv) Microspores and megaspores are produced in the same or two different types of plants.

Solution SAQ – 22:

Nonchordates:

- (i) Notochord is absent in them.
- (ii) Their central nervous system is solid and ventral.
- (iii) Their circulatory system is of open or closed type.
- (iv) Heart, if present in them, is dorsal in position.

Chordates:

- (i) Notochord is present in them at some of their developmental stage.
- (ii) Their central nervous system is hollow and dorsal.
- (iii) Their circulatory system is of closed type.
- (iv) Heart is always present and is ventral in position.

Solution SAQ – 23

Porifera differs from Cnidaria in following characters:

Porifera:

- (i) Cellular level of organisation.
- (ii) Digestion is intracellular.
- (iii) Appendages are absent in poriferans.
- (iv) They contain special cells called collar cells or choanocytes.

Cnidaria:

- (i) Tissue level of organisation.
- (ii) Digestion is both extracellular and intracellular.
- (iii) They have appendages in the form of tentacles.
- (iv) They contain special cells called cnidoblasts which contain nematocysts.

Solution SAQ – 24

A polyp is a cylinder with tentacles at the top. The Hydra looks like a tin can with slender arms coming from the top of its body. This body form does not move and the animals are trappers. The medusa is an umbrella shaped structure with tentacles hanging down from it. The jellyfish is an example. These animals move. During the reproductive stages of the jellyfish there is a time when they take on the polyp form. Then they bud off and become medusa.

Solution SAQ – 25

- (i) Sessile, sedentary, and marine except one group that lives in fresh water. These are non-motile animals attached to some solid support.
- (ii) Simplest multicellular, diploblastic animals.
- (iii) The body design involves minimal differentiation and division into tissues.
- (iv) Asymmetrical or radically symmetrical.

Example: Sponges and Sycon.

Solution SAQ – 26

- (i) Cnidarians or coelenterates are multicellular, diploblastic animals with tissue grade of organisation. A gelatinous layer called mesoglea persists between the ectoderm and endoderm.
 - (ii) Body shows radial symmetry.
 - (iii) Respiratory, circulatory and excretory organs are absent.
 - (iv) Nervous system is primitive, has only network of nerve cells.
- Example: Hydra and Aurelia (jelly-fish)

Solution SAQ – 27:

Bilateral symmetry:

- (i) Limbs and organs are paired.
- (ii) Cephalization is present.
- (iii) The animal body can be divided into two equal halves by one plane called mid-sagittal plane.

Radial symmetry:

- (i) Limbs and organs occur all around the central axis.
- (ii) Cephalization is absent.
- (iii) The animal's body can be divided into two equal halves by any vertical plane passing through the central axis.

Solution SAQ – 28:

- (i) Transparent body with biradial symmetry.
- (ii) Two tentacles and eight longitudinal rows of ciliary comb-plates for locomotion are present.
- (iii) Marine, solitary and free-swimming.
- (iv) No polymorphism or dimorphism occurs.

Example: Pleurobrachia and Cestum.

Solution SAQ – 29

- (i) Bilaterally symmetrical and dorsoventrally flattened animals.
- (ii) Body thin, soft, leaf-like or ribbon-like.
- (iii) Digestive cavity (when present) with a single opening, the mouth (anus is absent).
- (iii) Suckers and hooks are usually present.
- (iv) Circulatory and respiratory systems and skeleton are absent.

Example: Fasciola (liver-fluke) and Taenia solium (pork tape-worm)

Solution SAQ – 30

- (i) Bilaterally symmetrical, triploblastic, pseudocoelomate and unsegmented animals.
- (ii) Body is worm-like, cylindrical or flattened.
- (iii) Body is covered with a tough, resistant cuticle; cilia absent.
- (iv) Sexes are separate.

Example: Ascaris (round-worm) and Ancylostoma (hook-worm).

Solution SAQ – 31

- (i) Body triploblastic, bilaterally symmetrical, soft, elongated, vermiform and cylindrical or dorsoventrally flattened.
- (ii) Exoskeleton absent; body is covered by a thin cuticle.

- (iii) Alimentary canal is tube-like, complete and extends straight from mouth to anus.
 - (iv) Reproduction is by sexual means. Sexes may be united (hermaphroditic) or separate.
- Example: Nereis (sand worm) and Hirudinaria (leech).

Solution SAQ – 32

An individual which has both type of sex organs is called a hermaphrodite.
Example: Liver fluke, tape-worm.

Solution SAQ – 33

Triploblastic animals are the ones with three germ layers (a mesoderm as well as ectoderm and endoderm). The mesoderm allows them to develop true organs.
Example: Flat worms and humans.

Solution SAQ – 34

A coelomate animal is the one which has a body cavity in which well developed organs can be accommodated.
Example: Earthworm and Hirudinaria.

Solution SAQ – 35

- (i) Triploblastic, bilaterally symmetrical and metamerically segmented animals.
 - (ii) Body segments are grouped into two regions – cephalothorax (head and thorax together) and abdomen, or three regions – head, thorax and abdomen. Anterior part of body forms a distinct head, bearing sense organs and brain.
 - (iii) Exoskeleton of cuticle, containing protein, lipid, chitin and often calcium carbonate is secreted by underlying epidermis and shed (moulted) at intervals.
 - (iv) Alimentary canal is complete; mouth and anus lie at opposite ends of the body.
- Example: Palaemon (prawn) and Peripatus

Solution SAQ – 36:

- (i) Body is soft, bilaterally symmetrical, with little segmentation and without appendages. The size of body varies from a microscopic to a giant form such as Octopus of upto 50 feet.
 - (ii) Body cavity is haemocoel. True coelom is reduced and restricted to the pericardial cavity and the lumen of gonads and nephridia.
 - (iii) Digestive tract has a simple structure.
 - (iv) Sexes are usually separate.
- Example: Octopus and Sepia.

Solution SAQ – 37

- (i) Simple animals may be a star like, spherical or elongated.
- (ii) Body is triploblastic, coelomate, unsegmented and radially symmetrical.
- (iii) Body lacks head but has oral and aboral surfaces. Oral surface of the body has five radial

areas called ambulacra.

(iv) Body wall is covered with spiny hard calcareous (calcium carbonate) plates (ossicles) that forms a rigid or flexible endoskeleton.

Example: Echinus (sea urchin) and Asterias (star fish).

Solution SAQ – 38

(a) Palaemon.

(b) Musca.

(c) Asterias.

(d) Loligo.

(e) Pila.

(f) Unio.

Solution SAQ – 39

Echinodermata; The ambulacral system is the locomotive apparatus of the Phylum Echinodermata (sea-urchins, star-fishes, etc), the most important feature of which is the protrusible tube-feet that the animals can dilate with water at will, and thus move forward.

Solution SAQ – 40

(i) The body is boat shaped or stream lined.

(ii) Head, body and tail are compressed to make it suitable for locomotion in water, so that it offers little or no resistance for swimming in water.

(iii) The pelvic fins, pectoral fins, dorsal fin, anal and caudal fins act as paddles and control the direction of movement in water and provide balance.

(iv) The gills are well developed and suited for gaseous exchange in water.

(v) The lateral line receptors enable the fish to detect any changes caused by mechanical disturbances in the surrounding water.

(vi) The presence of air bladders in many bony fishes acts as an accessory respiratory organ as well as an organ for buoyancy. Using these bladders the fishes are able to maintain themselves at desired depths.

(vii) The body is covered with scales.

(viii) The presence of a third membrane called the nictitating membrane in the eye.

Solution SAQ – 41

(i) Marine fishes with completely cartilaginous endoskeleton are called chondrichthyes. They are generally large in size.

(ii) Streamlined body is either laterally compressed or spindle-shaped or dorsoventrally flattened and disc shaped.

- (iii) Mouth is ventral in position.
 - (iv) Skin is tough and covered with minute placoid scales.
- Example: Scoliodon (dog fish) and Torpedo (electric ray)

Solution SAQ – 42

- (i) Osteichthyes are marine and fresh water fishes with partly or whole bony endoskeleton.
 - (ii) Body is generally spindle shaped.
 - (iii) Skin is either naked or covered with cycloid or ctenoid scales.
 - (iv) Heart is two chambered containing one auricle and one ventricle.
- Example: Labeo (Rohu) and Synchiropus splendidus (mandarin fish)

Solution SAQ – 43:

(a) Cartilaginous fishes:

- (i) They have a cartilaginous endoskeleton.
- (ii) They contain five to seven pairs of gill slits.
- (iii) Their mouth is ventral in position.
- (iv) Swim bladder is absent in them.

Bony fishes:

- (i) They have a bony endoskeleton.
- (ii) They contain four pairs of gill slits.
- (iii) Their mouth is terminal in position.
- (iv) Air bladder is usually present in them

(b) Amphibia:

- (i) Their skin is glandular, smooth and moist.
- (ii) Scales are not present in them.
- (iii) They have a three chambered heart.
- (iv) Fertilisation is external.

Reptilia:

- (i) Their skin is non-glandular, dry and keratinized.
- (ii) Horny scales are present over their body.
- (iii) Their heart is incompletely four chambered.
- (iv) Fertilisation is internal.

(c) Aves

- (i) Forelimbs are modified into wings.
- (ii) The body is covered with feathers and scales.

- (iii) Mammary glands are absent.
- (iv) A toothless beak is present.

Mammals:

- (i) Wings are absent except in bats.
- (ii) Feathers and scales are absent. Hair is present.
- (iii) Females have mammary glands.
- (iv) Teeth are present. Jaws do not form beak.

Solution SAQ – 44

- (i) Mammals are warm-blooded and the most evolved animals of the Animal kingdom.
- (ii) Body is divisible into head, neck, trunk and tail. Moveable eyelids are present.
- (iii) Females have milk-producing mammary glands which secrete milk for the nourishment of the young.
- (iv) Respiration is through lungs only.

Example: Human beings and Monkey.

Solution SAQ – 45

Flight adaptations of the birds are the following:

- (i) Forelimbs are modified into wings.
- (ii) Body is covered with exoskeleton of waterproof and lightweight feathers.
- (iii) Long bones of endoskeleton are pneumatic having air cavities.
- (iv) All birds are toothless; their jaws are modified into horny beaks.
- (v) Body is streamlined to reduce air resistance during its flight.
- (vi) Birds have air sacs helping in double respiration.
- (vii) Flight muscles are well developed.
- (viii) Tail feathers form a steering apparatus.
- (ix) Birds have an acute vision.

Solution SAQ – 46

- (i) Body is bilaterally symmetrical, metamerically segmented, triploblastic and coelomate.
- (ii) A post-anal tail present at some stage of life.
- (iii) Segmental muscles in an unsegmented trunk.
- (iv) Ventral heart, with dorsal and ventral blood vessels and closed blood vascular system.

Solution SAQ – 47

Protochordata is one of the groups of phylum chordata. Protochordata constitutes the marine, small, primitive, or lower chordates. The members of protochordates lack a head, skull or cranium, vertebral column and brain. About 2000 species are found in this group. This is further divided into three subphylum: Hemichordata (e.g. Balanoglossus), Urochordata (e.g. Herdmania) and Cephalochordata (e.g. Branchiostoma) based on the position of notochord.

Solution SAQ – 48

- (i) Urochordata: Herdmania.
- (ii) Cephalochordata: Branchiostoma.

Solution SAQ – 49

Notochord is a transient mesodermal rod in the most dorsal portion of the chordate embryo. In other words, notochord is an ensheathed flexible rod of turgid cells located along the back of chordate embryos and some primitive chordates ventral to nerve cord. It provides place for the attachment of muscles. Notochord has given rise to jointed axial skeleton of vertebral column. Nerve cord is a collection of nerve fibres that runs throughout the length of an animal. It is hollow and dorsal in chordates where it gets modified into central nervous system of brain and spinal cord. Nerve cord is solid and ventral in nonchordates.

Solution LAQ – 1

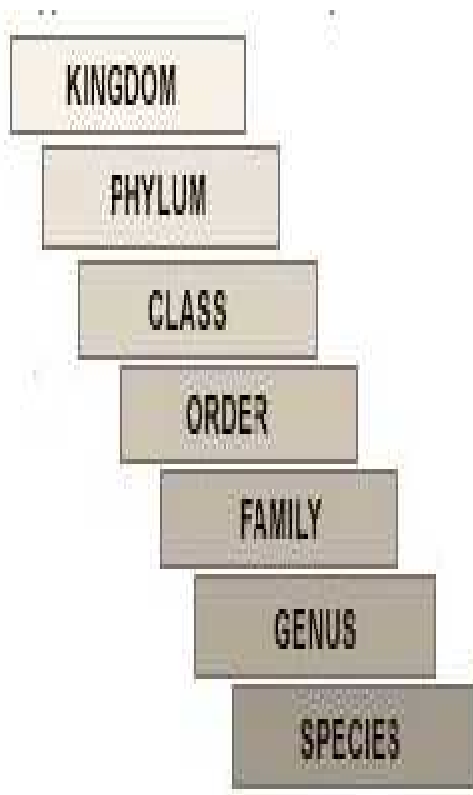
The Linnaean system of classification consists of a hierarchy of graded taxonomic (named) ranks that are called as taxa. Any given taxon (singular) may contain several lower taxa, which can be usually distinguished based on certain common characteristics. Such lower ranks may in turn be divided into a succession of progressively smaller ranks. The lower the rank of a group, the more similar are the organisms grouped in it. If any two given organisms can be grouped under the same lower rank or taxon, it implies that the two organisms are structurally, functionally, embryologically similar and that they have had a comparable evolutionary history.

Within the living world as a whole, the biggest taxonomic rank is Kingdom. The next higher rank within a kingdom is the Phylum or Division. It is customary to use the term phylum for major groups in the animal kingdom and the term division for major groups in the plant kingdom. The phylum or division is a broad grouping of more or less closely related organisms, sharing certain common characteristics.

Each phylum or division has the next taxon called Class. The members of each class exhibit certain distinguishing characters that are unique only to them.

In the same way, using comparable criteria of similarities and relationships, each class can be divided into orders, each order into families, each family into genera and each genus into species. Species is normally the basic or fundamental unit of classification. A species is therefore the narrowest taxonomic category and kingdom is the broadest category in the Linnaean hierarchy.

A typical Linnaean hierarchy has seven taxa represented as follows:



Solution LAQ – 2

Importance of classification:

- (i) It makes the study of such a wide variety of organisms easy.
- (ii) It projects before us a good picture of all life forms at a glance.
- (iii) It helps us understand the interrelationship among different groups of organisms.
- (iv) It serves as a base for the development of other biological sciences such as biogeography etc.
- (v) Various fields of applied biology such as agriculture, public health and environmental biology depends on classification of pests, disease vectors, pathogens and components of an ecosystem.

Solution LAQ – 3

Hierarchy is defined as sequence of categories in a decreasing or increasing order from kingdom to species and vice versa. Kingdom is the highest rank followed by division, class, order, family, genus and species. Species is the lowest rank in the hierarchy. The hierarchy has two categories which are obligate and intermediate. Obligate means they are followed strictly and range from kingdom to species as said above. Intermediate are not followed strictly and they are added in obligate list such as subdivision, super family, super class, suborder, subspecies etc.;

- (i) Species: Group of population which is similar in form, shape and reproductive features so that fertile sibling can be produced. Some siblings can be sterile when a hybrid is produced. A

hybrid can be product of female horse and male donkey (Mule). Sexual reproduction is present in eukaryotes. Species is followed by subspecies, varieties and races. These categories are inferior as compared to species.

(ii) Genus: It is defined as group of similar species. But it is not mandatory to have many species. Some genera have only one species known as monotypic. If there are more than one species it is known as polytypic. For example lion, tiger are quite similar species placed under the genus Panthera.

(iii) Family: It is defined as collection of similar genera. It can be separated from genera by reproductive and vegetative features. For example, cats and leopard are included in the family Felidae.

(iv) Order: One or more than one similar families constitute order. Family Felidae are included in the order Carnivora.

(v) Class: One or more than one order makes a class. Class Mammalia includes all mammals which are bats, rodents, kangaroos, whales, great apes and man.

(vi) Phylum: It is a term used for animals while its synonym division is used for plants. It is a collection of similar classes. Phylum chordata of animals has class Mammalia along with birds, reptiles and amphibians.

(vii) Kingdom: The top most taxonomic category. Example all animals are included in Kingdom Animalia. The unit in classification that denotes grouping of organism based on features which are observable is known as Taxon.

Solution LAQ – 4

Kingdom Monera is the first of the five kingdoms of biological classification. It comprised most organisms with a prokaryotic cell organization. For this reason the kingdom was sometimes called Prokaryota or Prokaryotae. Prior to its creation these were treated as two separate divisions of plants: the Schizomycetes (bacteria) were considered fungi, and the Cyanophyta were considered blue-green algae. The latter are now considered a group of bacteria, typically called the cyanobacteria.

Monera has been divided into Archaea and Bacteria, forming the more recent six-kingdom system and three-domain system. All new schemes abandon the Monera and now treat the Bacteria, Archaea and Eukarya as separate domains or kingdoms. To sum up:

(i) Kingdom Monera are one-celled without an organized nucleus. Examples: bacteria and blue-green “algae.”

- (ii) They have existed on earth longer and are more widely distributed than any other organisms.
- (iii) They are found in almost every imaginable habitat; in air, soil, and water and in extreme temperatures and harsh chemical environments.
- (iv) Their one distinguishing characteristic is that there are no membrane bound “organelles”.
- (v) Pre dominant mode of nutrition is absorption but some may be photosynthetic or chemosynthetic.
- (vi) Reproduction by asexual method.
- (vii) True mitotic cell division absent.

Solution LAQ – 5

Characteristics of Kingdom Protista:

- (i) They include many kinds of unicellular eukaryotic organisms such as unicellular algae, protozoans and unicellular fungi.
- (ii) They are found anywhere there is moisture.
- (iii) They are single celled, but many live in a colonial setting (more or less independently).
- (iv) Many are unicellular, but some are multicellular (Algae and fungus-like protists).
- (v) Some can live in very harsh environments.
- (vi) Reproduction can be sexual (conjugation), asexual (binary fission), or a combination of both.
- (vii) Some of these organisms use appendages, such as hair-like cilia (e.g. Paramecium) or whip-like flagellum (e.g. Euglena).
- (viii) Their mode of nutrition can be autotrophic or heterotrophic.

Examples: Paramecium and Amoeba.

Solution LAQ – 6

Characteristics of Kingdom Fungi:

- (i) Simple non-green plants which are not photosynthetic. They are heterotrophic and eukaryotic organisms. Some fungi, such as Puccinia, Albugo etc are parasites and draw their nutrients from living cells of their host plants. Some fungi, such as Mucor, Rhizopus etc are decomposers, deriving their nutrition from dead remains of plants and animals.
- (ii) They may be unicellular (yeast) or filamentous (most fungi). The body of a multicellular and filamentous fungus is called a mycelium and is composed of several thread like structures termed hyphae.
- (iii) Fungi have a cell wall containing a mixture of chitin and cellulose. Chitin is a tough complex sugar.
- (iv) Their reserve food material is glycogen.

Solution LAQ – 7

The division Spermatophyta (sperma = seed, phyton = plant), as the name suggests, includes all seed bearing plants. It has been divided into two sub divisions- Gymnosperms and Angiosperms. The sub-division Gymnosperms (gymno = naked, sperma = seed) includes simpler and primitive plants of the division Spermatophyta.

Gymnosperms: The gymnosperms are seed producing land plants. However, the seeds are not enclosed in fruits. Most of them have now become extinct and only about 900 species are known to be surviving. The living gymnosperms are widely distributed in the cold climates where snow, rather than rain, is the source of water. Only one group called cycads thrive in warmer regions. Example: Pinus.

Angiosperms: Angiosperms represent the most advanced group of vascular plants. They are commonly called 'Flowering plants'. They exceed all other major groups of living plants in number and diversity.

Example: Sunflower

Solution LAQ – 8

Any simple vascular plant that produces spores, but not seeds, and has the diploid stage of its life cycle as the dominant form is called a pteridophyte.

Ferns, Lycopodium, and Club mosses are all pteridophytes.

Bryophyta:

- (i) Plant body is gametophytic.
- (ii) Real stem and leaves are always absent.
- (iii) Fixation of plant body is carried out by rhizoids.
- (iv) Bryophytes are non-vascular in nature.

Pteridophyta:

- (i) Plant body is sporophytic.
- (ii) Real stem and leaves are present.
- (iii) Fixation of plant body is carried out by roots.
- (iv) Pteridophytes are vascular plants.

Solution LAQ – 9

(a) Characteristics of Platyhelminthes:

- (i) Bilaterally symmetrical and dorsoventrally flattened animals.
 - (ii) Body is thin, soft, leaf-like or ribbon-like.
 - (iii) Digestive cavity (when present) with a single opening, the mouth (anus is absent).
 - (iv) Suckers and hooks are usually present.
 - (v) Circulatory and respiratory systems and skeleton are absent
 - (vi) Hermaphrodite i.e. both male and female reproductive organs occur in the same individual.
- Example: Fasciola (liver-fluke) and Taenia solium (pork tape-worm).

(b) Characteristics of Nematoda:

- (i) Bilaterally symmetrical, triploblastic, pseudocoelomate and unsegmented animals.
 - (ii) Body is worm-like, cylindrical or flattened.
 - (iii) Body is covered with a tough, resistant cuticle; cilia absent.
 - (iv) Sexes are separate.
 - (v) Most forms are parasitic but some are free-living in soil or water.
- Example: *Ascaris* (round-worm) and *Ancylostoma* (hook-worm).

Solution LAQ – 10

Characteristics of Annelida:

- (i) Body triploblastic, bilaterally symmetrical, soft, elongated, vermiform and cylindrical or dorsoventrally flattened.
- (ii) Exoskeleton absent; body is covered by a thin cuticle.
- (iii) Alimentary canal is tube-like, complete and extends straight from mouth to anus.
- (iv) Reproduction is by sexual means. Sexes may be united (hermaphroditic) or separate.
- (v) True coelomate animals with closed blood vascular system. Coelom allows true organs to be packaged in the body structure.
- (vi) They live in a variety of habitats. Mostly aquatic, marine or fresh water. Some are terrestrial, burrowing in tubes while some are free-living forms.

Different classes and examples:

Class I: Polychaeta – *Nereis* (sand worm)

Class II: Oligochaeta – *Pheretima* (earthworm)

Class III: Hirudinea: *Hirudinaria* (Indian cattle leech)

Solution LAQ – 11

Characteristics of Mollusca:

- (i) Body is soft, bilaterally symmetrical, with little segmentation and without appendages. The size of body varies from a microscopic to a giant form such as Octopus of upto 50 feet.
- (ii) Body cavity is haemocoel. True coelom is reduced and restricted to the pericardial cavity and the lumen of gonads and nephridia.
- (iii) Digestive tract has a simple structure.
- (iv) Sexes are usually separate.
- (v) Respiration through gills, mantle or a “lung” of the mantle.
- (vi) Circulatory system is open except in cephalopods.
- (vii) Excretion by a pair of metanephridia or kidneys.

Classes and their examples:

- (i) Gastropoda: *Pila* (apple snail)

(ii) Pelecypoda: Unio (fresh water mussel)

(iii) Cephalopoda: Loligo (squid)

Solution LAQ – 12

Characteristics of Arthropoda:

(i) Triploblastic, bilaterally symmetrical and metamerically segmented animals.

(ii) Body segments are grouped into two regions – cephalothorax (head and thorax together) and abdomen, or three regions – head, thorax and abdomen. Anterior part of body forms a distinct head, bearing sense organs and brain.

(iii) Exoskeleton of cuticle, containing protein, lipid, chitin and often calcium carbonate is secreted by underlying epidermis and shed (moulted) at intervals.

(iv) Alimentary canal is complete; mouth and anus lie at opposite ends of the body.

(v) Respiration through general body surface, by gills, air tubes (tracheae) or book-lungs.

(vi) True nephridia absent. Excretion by coelomoducts, malpighian tubules or green or coxal glands.

(vii) Sexes are usually separate; sexual dimorphism is well marked in several forms.

(viii) Fertilisation is usually internal, oviparous or ovoviviparous and often with metamorphosis.

Classes and their examples:

(i) Crustacea: Palaemon (prawn)

(ii) Myriapoda: Scolopendra (centipede)

(iii) Insecta: Lepisma (Silver fish)

(iv) Arachnida: Limulus (king crab)

Solution LAQ – 13

(1) Phylum Porifera – Sessile, sedentary, and marine except one group that lives in fresh water. These are non-motile animals attached to some solid support.

Example: Sponges

(2) Phylum Coelenterata – Cnidarians or coelenterates are multicellular, diploblastic animals with tissue grade of organisation. A gelatinous layer called mesoglea persists between the ectoderm and endoderm.

Example: Aurelia (jelly-fish)

(3) Phylum Platyhelminthes – Bilaterally symmetrical and dorsoventrally flattened animals with a soft, leaf-like or ribbon-like thin body.

Example: Taenia Solium (pork tape-worm)

(4) Phylum Nematoda – Bilaterally symmetrical, triploblastic, pseudocoelomate and

unsegmented animals. Body is worm-like, cylindrical or flattened.

Example: Ascaris (round-worm)

(5) Phylum Annelida – Body triploblastic, bilaterally symmetrical, soft, elongated, vermiform and cylindrical or dorsoventrally flattened, exoskeleton absent; body is covered by a thin cuticle.

Example: Hirudinaria (Indian cattle leech)

(6) Phylum Arthropoda – Body segments are grouped into two regions – cephalothorax (head and thorax together) and abdomen, or three regions – head, thorax and abdomen. Anterior part of body forms a distinct head, bearing sense organs and brain.

Example: Palaemon (prawn)

(7) Phylum Mollusca – Body is soft, bilaterally symmetrical, with little segmentation and without appendages. The size of body varies from a microscopic to a giant form such as Octopus of upto 50 feet.

Example: Octopus (devil fish)

(8) Phylum Echinodermata – Simple animals may be a star like, spherical or elongate with body triploblastic, coelomate, unsegmented and radially symmetrical.

Example: Echinus (sea urchin)

(9) Phylum Chordata – Chordates are characterised by the following three features: (a) a dorsal, hollow, tubular nerve cord; (b) a pliable rod called notochord that occurs ventral to nerve cord and is replaced by a bone or cartilage to form a vertebral column in vertebrates; and (c) paired gill-slits in the pharynx.

Example: Fishes

Solution LAQ – 14

Characters of birds:-

- (i) Forelimbs are modified into wings.
- (ii) The body is covered with feathers and scales.
- (iii) Mammary glands are absent.
- (iv) A toothless beak is present.
- (v) Skin is dry only, a single preen gland is present.
- (vi) A diaphragm is absent.
- (vii) Bones of birds are hollow or pneumatic.
- (viii) Larynx of birds is non-functional.
- (ix) Lungs contain external air sacs.
- (x) Birds are oviparous.

Example: Crow and peacock.

Characters of mammals:-

- (i) Wings are absent except in bats.
- (ii) Feathers and scales are absent. Hair is present.
- (iii) Females have mammary glands.
- (iv) Teeth are present. Jaws do not form beak.
- (v) Skin bears a number of sweat and oil glands.
- (vi) Diaphragm is present.
- (vii) Bones of mammals do not have air cavities.
- (viii) Larynx of mammals is functional.
- (ix) Lungs do not have external air sacs.
- (x) Mammals are viviparous.

Example: Human beings and monkeys.

Solution LAQ – 15

The subphylum 'Gnathostomata' is divided into six different classes. Out of the six two classes, Chondrichthyes and Osteichthyes combine together to form a super-class, called Pisces.

Chondrichthyes:

- (i) Marine fishes with completely cartilaginous endoskeleton. They are generally large in size.
- (ii) Streamlined body is either laterally compressed or spindle-shaped or dorsoventrally flattened and disc shaped.
- (iii) Mouth is ventral in position.
- (iv) Skin is tough and covered with minute placoid scales.
- (v) Heart is two chambered.
- (vi) Excrete urea (ureotelic animals).

Example: Scoliodon (dog fish) and Torpedo (electric ray)

Osteichthyes:

- (i) Marine and fresh water fishes with partly or whole bony endoskeleton.
- (ii) Body is generally spindle shaped.
- (iii) Mouth is usually terminal in position.
- (iv) Skin is either naked or covered with cycloid or ctenoid scales.
- (v) Heart is two chambered containing one auricle and one ventricle.
- (vi) Excrete ammonia (ammonotelic animals).

Example: Labeo (Rohu) and Synchiropus splendidus (mandarin fish)