IX Biology - 3. Diversity
(Module Detailed Solution)

Subjective questions

LEVEL1

1. Bilateral – Octopus, Snail
   Radial – Starfish, Jellyfish
2. An arthropod is an animal with no internal spine, a body made of joined segments, and a hard covering, like a shell. The Modern Latin root is Arthropoda, which is also the name of the animals' phylum, and which means "those with jointed feet."-
3. Pteridophytes (naked embryo = spores).
4. Only two kinds of egg-laying mammals are left on the planet today—the duck-billed platypus and the echidna, or spiny anteater.
5. The scientific name of silverfish is *Lepisma saccharina*. It is a wingless insect belonging to phylum Arthropoda.
6. Reticulate venation involves irregular distribution of veins to form a network. Mostly dicots plant have reticulate venation. Examples of plants showing reticulate venation include rose, tulsi, hibiscus, papaya, Mangifera.
7. A plant body that is not differentiated into stem and leaves and lacks true roots and a vascular system. Thalli are typical of algae, fungi, lichens, and some liverworts.
8. Thallophyta (Algae) – Cell wall made up of cellulose.
9. Gymnosperms (seeds are not enclosed within fruit wall).
10. Tentacles have special structures known as the nematocysts which help in capturing and paralyzing prey. Coelenterates simply wave their tentacles and when a prey comes in contact, the nematocysts inject the toxin that paralyses or kills the prey.
11. It is found in monocot group of angiosperm.
12. Leech is the annelid that sucks blood from cattle and human beings.
13. Corals are marine invertebrates within the class Anthozoa of the phylum Cnidaria.
14. The binomial system of nomenclature was introduced by Carolus Linnaeus. In this system, he gave scientific names to plants and organisms in which the first part is 'genus' and the second part is 'species'.
15. Aves and Mammals.

LEVEL 2

1. Linnaeus classified all living organisms into two kingdoms – Plantae and Animalia.
   Whittaker proposed an elaborate five kingdom classification – Monera, Protista, Fungi, Plantae and Animalia.
2. Refer page no. 61 (Subtopic – Cryptogamae).
3. Refer page no. 64 (Subtopic – Difference between Bryophtes and Pteridophytes).
4. Refer page no. 61 (Subtopic – Thallophyta).
5. The number of similar characters of categories decreases from lowest rank to highest rank. The hierarchy includes seven obligate categories – kingdom, division or phylum, class, order, family, genus and species.
6. Refer page no. 59 (Subtopic – Protista).
7. a)Algae is mostly aquatic.
   Fungi is mostly terrestrial
   b) chlorophyll present in algae.
   chlorophyll is absent in fungi.
   c)algae : auto trophic nutrition
   fungi : hetero trophic
   d)light is essential for survival of algae.
   no light required for survival of fungi.
   e)algae cell wall compose of cellulose.
   fungi cell wall compose of chitin.
   f)algae reserve food material as starch.
   fungi reserve food material as glycogen.
8. Refer page no. 77 (subtopic – Aves).
9. Porifera- Animals belonging to this group have pores all over the body, which are utilized to circulate the water throughout the body, which brings food and oxygen.

Coelenterata- They are diploblastic, i.e., the body is made up of two layers of cells; one layer makes up cells on the outside of the body and other makes up the inner lining of the body.
Annelida- Animals of group Annelida show metameric segmentation. Metameric segmentation is a longitudinal division of the body into a similar section of parts.
Arthropoda- Includes animals with jointed appendages.
Mollusca- They are soft-bodied animals with bilateral symmetry.
Echinodermata- These are spiny-skinned marine animals.

10. a-Thallophyta
    b-without vascular tissue
    c-Pteridophyta
    d-phanerogamae
    e-bear naked seeds - gymnosperm
    f-angiosperms
    g-have seeds with two cotyledons
    h-monocots

LEVEL3

1. Protozoans are unicellular, eukaryotic organisms having a heterotrophic mode of nutrition. They are considered as the relatives of animals because of their motile nature and heterotrophic mode of nutrition. The kingdom Animalia includes all multicellular, eukaryotic, heterotrophic organisms whereas, the kingdom Protista includes all unicellular, eukaryotic and heterotrophic organisms. Hence, Protozoans are placed under the kingdom Protista instead of the kingdom Animalia.
2. Refer page no. 74 (Subtopic – Pisces)
3. *Chiton*, *Pila*, *Unio*, Octopus.
4. Amphibians are the organisms that live on both land and in water. Bryophytes are called amphibians of the plant kingdom because these plants live in soil but they need water for asexual reproduction. They are mostly found on marshy and wetlands where they can adapt to survive with both water nutrients and soil nutrients. Asexual reproduction is the main method of reproduction in bryophytes. It occurs through the production of spores. Though bryophytes live on the land, they require water for fertilization. The sperms of bryophytes swim through water to the eggs with the help of their flagella. So bryophytes are called amphibians of the plant kingdom.
5. (a) The animals with bilateral symmetry are put in group bilateria. The body can be divided into two identical right and left halves in only one plane. E.g., platyhelminthes, annelids, arthropods, etc.
   (b) Coelom is the body cavity present between the body wall and the gut wall. Presence or absence of coelom is very important basis of classification.
   (i) Acoelomate Coelom is absent. e.g., poriferous, coelentrates, ctenophores and flatworms.
   (ii) Pseudocoelomate The body cavity is not lined by mesoderm instead it is present as scattered pouches in between mesoderm and endoderm. e.g., round worms.
   (iii) Eucoelomate Presence of true coelom.
   (c) Germ layers gives rise to all the tissues/organs of the fully formed individuals. On the basis the number of germ layers animals can be
   (i) Diploblastic The body cells are arranged in two layers on outer ectoderm and on inner endoderm, e.g., Coelentrates.
   (ii) Triploblastic Body wall of animals is made up of three germ layers i.e., ectoderm, mesoderm and endoderm e.g., Platyhelminthes to chordates.
6. Mango tree is more complex and evolved because, it is eukaryotic, autotrophic, terrestrial and a sporophyte with covered seed. The bacteria is a unicellular prokaryote and fungi is heterotrophic, simple thallophyte with no tissue system.
7. Snake and turtle belong to same class-Fteptilia. They are kept in same class because both (i) are cold-blooded. (ii) have scales as outer covering. (iii) have lungs for breathing.
8. Bat, rat and cat belong to the class mammalia and all have following common features:
   have notochord at some stage of life cycle.
   are warm-blooded.
   have four-chambered heart.
   have skin covered with hair and sweat and oil glands
9. The organism is snail which belongs to the phylum mollusca.
10. A major difference between monerans and protists lies in the nucleus, which is the "command center" of a cell. Monerans do not have a true nucleus, while protists have nuclei bound in their own nuclear membranes. Scientists classify organisms with true nuclei as eukaryotes and organisms without them as prokaryotes.

MCQ (Level1)

1. (c) Classification of living organisms into different groups based on their characteristics is termed as taxonomy. Three main objectives of taxonomy are Identification, Nomenclature and Classification. It was brought in use by Carolus Linnaeus. So, the correct option is(C) 'Identification, nomenclature and classification of organisms'.
2. (a) AP De Candolle was a Swiss Botanist who coined the term "Taxonomy". He also proposed a natural method to classify plants and also was one of the first people to distinguish between the morphological and physiological characteristics of organs in plants. So, the correct answer is, 'De Candolle'.
3. (c) The given hierarchy of classification can be described as :
   i. Species: Species is the lowest category regarded as the basic unit of classification. It is a group of similar individuals which resemble with each
   other in morphology, and capable of interbreeding.
   ii. Genus: A genus is a group of closely resembling species having a common ancestry.
   iii. Family: A family represents a larger group of closely related genera resembling each other in anatomical and reproductive features. It is composed of one or more genera.
   iv. Order: An order is a group of closely related families. For example, the family Felidae (that includes cats) and the family *Canidae* (that includes dogs) are assigned to the order carnivore.
   So, the correct option is 'Family'.
4. (b) In the year 1866, Ernst Haeckel proposed the three kingdom classification. The three kingdoms are protista, plantae and animalia. This system was developed by Haeckel to overcome the drawback of the two kingdom classification proposed by Linnaeus.
5. (d) Whittaker (1969) proposed a Five Kingdom Classification. The kingdoms defined by him were named Monera, Protista, Fungi, Plantae, and Animalia. Hence In five kingdom classification, Euglena is placed in Protista. So, the correct answer is 'Protista'
6. (c) Fungi plays an important role in the environment. Fungi are ecologically important to humans because they are decomposers and essential for nutrient cycling.
7. (a) The correct taxonomic hierarchy in the correct order is given by
   Kingdom → Phylum → Class → Order → Family → Genus → Species
   Species is the lowest level of classification and shows the high level of similarities among the organisms. One species can be distinguished from other closely related species based on distinct differences in morphology.
   So, the correct option is 'Species'.
8. (d) A taxon is a taxonomic group or taxonomic unit. Each category is referred to as a unit of classification in fact, represents a rare and is commonly termed as taxon. The term taxon is a collection of more than one population of the organisms or organism seen by the taxonomists for forming a unit. There are seven main taxanomic ranks: kingdom, phylum or division, class, order, family, genus, species.
9. (d) Protista includes all unicellular and colonial eukaryotes.
   Blue green algae is a unicellular prokaryote. It is classified under kingdom Monera.
10. (c) The correct hierarchy of classification of various taxons in descending order is given by :
    Kingdom → Phylum → Class → Order → Family → Genus → Species
    The kingdom is the highest level of classification and contains the maximum number of species followed by Phylum while species being the most specific having minimum number of members.
    So, the correct option is 'Phylum'.
11. (d) The binomial system of nomenclature was introduced by Carolus Linnaeus. In this system, he gave scientific names to plants and organisms in which the first part is 'genus' and the second part is 'species'.
12. (a) Hierarchy is the arrangement of organisms in a definite sequence of categories depending upon their relative dimensions. The hierarchy include seven categories: kingdom, phylum, class, order, family, genus and species. The categories are arranged in a descending sequence. The hierarchical system of classification was introduced by Linnaeus.
    Thus, the correct answer is option A.
13. (b) Plants producing naked seeds belong to gymnosperms. The ovules are freely exposed before and after fertilization i.e., their seeds are not enclosed in fruits.
14. (b) Plants producing naked seeds belong to gymnosperms. The ovules are freely exposed before and after fertilization i.e., their seeds are not enclosed in fruits.
15. (d) Phanerogams, also known as spermatophytes, refer to all seed plants. Gymnosperms are the seed bearing plants wherein seeds are naked i.e., not enclosed by ovary or fruit. Angiosperms are seed bearing plants wherein seeds are enclosed within ovary or fruit. Since both gymnosperms and angiosperms are seed bearing plants and therefore are

included under phanerogams. Pteridophytes are categorized under cryptogams, not under phanerogams, as they do not form seed or flowers. This makes option D correct answer.

16. (b) Radial.
Hydras, like all cnidarians, display radial symmetry. This means that they are formed with a distinct top and bottom, but no distinguishable right or left side.
17. (b) Coelom refers to the main body cavity and body cavity is any fluid-filled space in a multicellular organism. It is the space where internal organs develop. The organisms can have true coelom (called as eucoelomates) or false coelom (called as pseudocoelomates).
Eucoelomates have a fluid-filled body cavity and is formed within the mesoderm layer and thus, lined with mesoderm layer.
18. (d) Metamorphosis can be defined as a rapid and complete transformation from an immature larval life to a sexually adult form involving morphology, function and habitat change.
Hormones called moulting and juvenile hormones, which are not species specific, apparently regulate the changes during the following processes. So, the correct option is 'Metamorphosis'.
19. (a) A. In acoelomate animals, there is no body cavity. The region between the ectodermal epidermis and the endodermal digestive tract is completely filled with mesoderm is the in the form of a spongy mass of space filling cells called parenchyma. For example, Phylum Porifera, Coelenterata, Ctenophora and Platyhelminthes.
B. In pseudocoelomate animals, a false coelom or perivisceral cavity is present. For example, Phylum Aschelminthes and Nematoda.
C. In schizocoelomate animals, coelom develops as a split in the mesoderm sheet. For example, Phylum Annelida and Arthropoda.
D. In enterocoelomate animals, coelom is formed from the pouches of the archenteron.
Hence, porifers are acoelomate. So, the correct answer is 'Acoelomate'.
20. (a) A. Sponges belong to phylum Porifera and are the most primitive of multicellular animals. These animals exhibit only cellular levels of body organisation and thus, are considered as the simplest forms among the metazoans.
B. Coelenterates are generally marine, aquatic, sessile or free swimming and are radially symmetrical. These are a step ahead of sponges in complexity.
C. Flat worms belong to phylum Platyhelminthes. These are found in marine, freshwater and damp terrestrial environment also.
D. Round worms belong to phylum Aschelminthes. Some are parasites while some are free living.
So, the correct answer is 'Sponges'.

Level 2

1. (c) The answer is *Aulosira*. *Aulosira* is a genus of cyanobacteria found in a variety of environmental niches that forms colonies composed of filaments of moniliform cells. This increases fertility in rice fields, often used by farmers.
2. (c) The nucleoid (meaning nucleus-like) is an irregularly-shaped region within the cell of a prokaryote that contains all or most of the genetic material, called as genophore. In contrast to the nucleus of a eukaryotic cell, it is not surrounded by a nuclear membrane. The nucleoid is an irregularly-shaped region within the cell of a prokaryote that contains all or most of the genetic material. In contrast to the nucleus of a eukaryotic cell, it is not surrounded by a nuclear membrane. The genome of prokaryotic organisms generally is circular, double-stranded piece of DNA, of which multiple copies may exist at any time. The length of a genome varies widely.
3. (d) Prokaryotes are unicellular organisms that lack membrane-bound cell organelles. Ribosomes are the organelles made up of proteins and RNA molecules called subunits. These are involved in protein synthesis. The prokaryotic ribosomes are of 70S type, unlike the eukaryotic ribosomes which are of 80S type.
4. (d) Scientists hypothesize that the first protists evolved from prokaryotes. Evidence indicates that eukaryotic organelles such as mitochondria and chloroplasts originated as prokaryotes that lived inside other, larger prokaryotic cells. This hypothesis is called the endosymbiotic hypothesis or the Theory of Endosymbiosis.
5. (c) Moss spores germinate to form an algae-like filamentous structure called the protonema. It represents the juvenile gametophyte. Protonema are characteristic of all mosses and some liverworts but are absent from hornworts.
6. (a) Amphibians are the organisms that live on both land and in water. Bryophytes are called amphibians of the plant kingdom because these plants live in soil but they need water for asexual reproduction. They are mostly found on marshy and wetlands where they can adapt to survive with both water nutrients and soil nutrients. Asexual reproduction is the main method of reproduction in bryophytes. It occurs through the production of spores. Though bryophytes live on the land, they require water for fertilization. The sperms of bryophytes swim through water to the eggs with the help of their flagella. So bryophytes are called amphibians of the plant kingdom.

7. (a) Pteridophytes are vascular plants and have leaves (known as fronds), roots and sometimes true stems, and tree ferns have full trunks. Examples include ferns, horsetails and club-mosses. In pteridophytes, the main plant body is a sporophyte which is differentiated into true root, stem and leaves.
8. (b) As in land plants, the major carbohydrate storage product of the green algae is usually starch in the form of amylose or amylopectin. These starches are polysaccharides in which the monomer, or fundamental unit, is glucose.
9. (d) Cryptogams include all non-flowering plants such as algae, fungi, lichens, mosses and fern (Kryptos: concealed; gamus: marriage). Cryptogamae is further subdivided into three parts: Thallophyta, Bryophyta and Pteridophyta.
10. (c) Aschelminthes have a false body cavity also called as pseudocoelom. The animal possesses digestive canal with two opening at the end such as mouth at the anterior end and anus at the posterior end. A digestive canal is present in the body cavity and hence, it is called as 'tube within a tube' body plan. Poriferans show cell aggregate plan while Coelenterates and Platyhelminthes show blind sac body plan.
11. (a) Platyhelminthes.
    Platyhelminthes phylum was the first one to be triploblastic, that is, they had all the 3 embryonic layers.
    Platyhelminthes do not have any coelom so they are called acoelomates.
    Examples of organisms belonging to Platyhelminthes phylum - Tapeworm and Liver fluke.
    These are also called flatworms.
12. (a) Hydra has an unsegmented body.
13. (a) Coelomate animals, true coelom animals have a fluid-filled body cavity, called as coelom as it lined with mesoderm layer. But if the fluid filled the cavity is not lined with mesoderm layer called as pseudocoelome which is the key characteristic of the nematodes.
14. (c) Option C viviparous.
    Animals that have live births because they nourish the unborn young internally with a placenta are the mammals, except the monotremes. They retain their eggs internally until they hatch then feed the young milk. These are the viviparous mammals.
15. (a) Cellular grade is the characteristic of sponges because in a sponge, cells exhibit division of labour for performing specialized functions.

Level 3

1. Plant body is thallus in: (a) Gymnosperms (b) Algae (c) Angiosperms (d) Pteriodophyta
   (b) In thallophytes (algae), plant body is simplest of all and is not differentiated into root, stem and leaf. Such a body is called as a thallus. Reproductive parts are unicellular and the main plant body is gametophyte.
2. (d) Pteridophtyes, gymnosperms and angiosperms all contain vascular bundles.
3. (d) Bryophytes and Pteridophytes possess multicellular sex organs with a jacket of sterile cells.
4. (a) A plant having seed but lacking flowers and fruit belongs to gymnosperms. Gymnosperms are vascular land plants and bears seeds which are naked i.e., ovules not enclosed in the ovary. Hence, flowers are absent.
5. (a) From the point of view of their evolution the Bryophytes stand at level higher than that of Thallophytes but lower than that of Pteridophytes and Phanerogams. The plants belonging to Algae are commonly found in water and rarely on the land, whereas the Bryophytes are land inhabiting plants.
6. (b) A pteridophyte is a vascular plant (with xylem and phloem) that disperses spores.
   Because pteridophytes produce neither flowers nor seeds, they are referred to as "cryptogams", meaning that their means of reproduction is hidden.
7. (b) Option −(*B*) Frog, Snake
   Cold blooded animals can be either terrestrial or aquatic. Cold blooded is an informal term for one or more of a group of characteristics that determine an animal's thermophysiology.
8. (b) Sponge belongs to phylum Porifera. It has a cellular level of organisation and thus, there are no definite organs or organ systems. It has a special system, called as canal system that allows water current to pass through this system. The animals have to depend on this canal system for nutrition, respiration, excretion, reproduction etc.
9. (b) Sponges belong to phylum Porifera and are the most primitive of multicellular animals. These animals exhibit only cellular levels of body organisation and thus, are considered as the simplest forms among the metazoans.
10. (d) Corals generally form colonies of individual polyps and the calcium carbonate skeleton that it comprises makes it stone-like. The colonies are connected by a thin layer of tissue.
    So, the correct answer is 'Both Colonial and Stony'.
11. (d) Coelom is the main body cavity in most of the animals which are located between the intestinal canal and the body wall. They have a flat body shape and have no coelom or fluid-filled body cavity.
12. (d) The name of the phylum is derived from the Latin word annellus, which means a small ring. The phylum

includes earthworms, polychaete worms, and leeches. Annelids show protostomic development in embryonic stages and are often called "segmented worms" due to their key characteristic of metamerism, or true segmentation.

13. (b) Metamerism is the phenomenon of having a linear series of body segments fundamentally similar in structure,shape,size. Metameric segmentation is the characteristic of Annelida (e.g., earthworm) and Arthropoda (e.g. Cockroach). So the correct option is B.
14. (a) Insects have the blood which does not contain any pigment protein like hemoglobin. The blood is not involved in the transport of oxygen. The oxygen is distributed with the help of system which is comprised of tubes and air sacs. The blood does not have haemoglobin and is colourless, pale yellow or green. The blood is known as hemolymph which does not perform the function of transport of oxygen. In human beings, blood is used to carry oxygen from the lungs to the tissues.
15. (d) Mollusca is the phylum of the animal kingdom. They are bilaterally symmetrical triploblastic. They have unsegmented soft body covered with the calcareous hard shell. The body has more than two cell layers, tissues and organs. The body does not have the cavity. The body possesses gut with mouth and anus. It has an open circulatory system with a heart and an aorta and a pair of kidneys. Live in most environments.
16. (b) Starfish or sea stars are star-shaped echinoderms. They belong to the class Asteroidea. Starfish are marine invertebrates. They typically have a central disc and five arms.
17. (b) The notochord is a flexible rod-shaped structure made up of cartilage.
    Chordates are organisms that have a notochord at any stage of its life cycles.
    In vertebrates, this notochord becomes part of the vertebral column.
18. (b) Refer page no. 72 (3rd point under subtopic Chordates)
19. (a) Sea Horse (Hippocampus) is a fish belonging to class Osteichthyes under the class Pisces. So, the correct answer is 'Pisces'.
20. (c) Most sharks are cold-blooded. They can raise their temperature about the temperature of the water.
21. (b) In vertebrates, notochord is present only in embryonic stages and then it is replaced by a vertebral column or backbone.
    In chordates, notochord is present throughout the life of the organism.
    Hence, all vertebrates are chordates but all chordates are not vertebrates.
    So, the correct answer is 'All vertebrates are chordates'.
22. (a) A. Fishes have a two-chambered heart (one auricle and one ventricle).
    B. Amphibians have a three-chambered heart (two auricles and one ventricle).
    C. Reptiles have incompletely four-chambered heart (two auricles and partly divided ventricles).
    D. Birds have a four-chambered heart (two auricles and two ventricles).
    So, the correct answer is 'Fishes'.
23. (d) Vertebrates have a complex circulatory system with a fully developed heart. The heart is divided into several chambers to separate the oxygenated from deoxygenated blood.
    Fishes have two chambered with one auricle and one ventricle, amphibians and reptiles have a three-chambered heart with two auricles and one ventricle. The ventricles have a partial septum which incompletely divides the heart which leads to mixing of oxygenated and deoxygenated blood.
24. (d) Turtles belongs to class Reptilia. They are cold blooded and terrestrial animals. They reproduce by laying eggs and thus, are oviparous.
25. (d) A) Ostrich is oviparous (lays eggs).
    B) Penguin is oviparous.
    C) Albatross is oviparous
    All bird are oviparous. There is no viviparous bird.
    So the correct answer is 'None',
26. (d) Birds and reptiles lay large eggs. The development is direct and entire development of progeny is dependent on the nutrition available through egg only. Mammals don't lay eggs and their eggs have less yolk which cannot support the development of the foetus. Hence the development of foetus takes place inside the body of parent usually female parent and then directly young ones are delivered. Among birds egg of Ostrich is largest and is often claimed as the largest animal cell with weights nearly 1.5 Kg. and requires about 50 minutes to boil it.
27. (d) Warm-blooded animals are those with the ability to maintain their internal body temperature. Their body temperature does not vary too much with the temperature fluctuations in the external environment. Out of the given options, only birds are warm-blooded animals and the rest are cold-blooded.

So, the correct answer is 'Birds'.

28. (b) The mammals have evolved from Therapsid (mammal-like) reptiles some 220 million years ago in the Triassic period, before the first birds.
    So, the correct answer is 'Reptiles'

29. (b) Organisms that give rise to young ones are called viviparous and organisms that lays egg are called oviparous. Mammals generally give birth to young ones. Oviparous mammal is platypus and echidna.
So, the correct answer is 'Platypus'.

Assessment Test

1. A eukaryotic organism which is single-celled and photosynthetic is placed under the kingdom Protista.
2. Monera are prokaryotic unicellular bacteria whose genetic material is dispersed loosely in the cell. On the other hand, the genetic material of plants and other eukaryotes is held in the cell nucleus. Therefore, blue green algae are placed in Kingdom Monera and not in Kingdom Plantae.
3. Refer page no. 64 (Subtopic – Difference between Bryophtes and Pteridophytes).
4. The lowermost category in the hierarchy of classification of groups of organisam is species.
5. Ques -What would you call the symbiotic relationship between fungi and certain blue-green algae
Solution - Blue green algae and fungi form a symbiotic association is called as lichen. In this relationship algae produce food and fungi provide protection and anchoring of body.
6. Symbiosis is any type of a close and long-term biological interaction between two different biological organisms. The organisms that exhibit symbiosis are called individually called symbiont. These organisms (symbiont) may belong to same or different species.
7. Pteridophytes.
8. Saprophytes belong to the group Fungi. They are called saprophytes because they are dependent on dead or decaying organic matter as a source of nutrition.
9. Primitive organisms have a simpler body design with unbound nucleus whereas advanced organisms are more complex in body design with membrane bound nucleus. Primitive organisms evolved much early whereas advanced organisms have evolved relatively recently.
10. Refer page no. (61 to 65).
11. There should be systematic naming of living organisms because then only scientists and biologists would be able to study about them properly. Naming helps in easily classification and putting them into most appropriate place in the evolutionary and biological chart. To reduce the confusion all living organism were named systematically, so that when someone use the name of a particular living organism the other person from different country will be able to understand it.
12. Vascular plants – Pteridophytes, Gymnosperms and Angiosperms.
Angiosperms van be classified as Monocots and Dicots, based on number of cotyledons.
Angiosperm - All angiosperms have flowers at some stage in their life. All angiosperms produces fruits which is actually a ripened ovary.
13. (i) Monerans have prokaryotic cells.
(ii) Prokaryotes do not have membrane bound organelles. They have naked genetic material called nucleoid. They can be autotrophic or heterotrophic.
14. Fishes.
15. The reptile which has a 4 chambered heart is the crocodile.
16. Spider, Cockroach, Prawn and Housefly, all four belongs to the phylum Arthropoda.
17. The bodies of sponges (poriferan) are porous. Their body has holes or pores all over, which allows the circulation of water throughout the body and bring in food and oxygen. This system is known as canal system.
18. Porifera.
19. Animalia.
20. Mollusca.
21. Mollusca, echinodermata, Annelida.
22. i) a) Class Aves: They are warm blooded, lay eggs, 4 chambered heart and have covering of feathers.
b) Reptiles are cold-blooded and breathe with lungs. They have scales.
ii) Aves – Pigeon, Reptiles – Snakes.

Correct the numbering of questions in module (from 23 to 30).

23. While both are eukaryotic and don't move, plants are autotrophic - making their own energy - and have cell walls made of cellulose, but fungi are heterotrophic - taking in food for energy - and have cell walls made of chitin.
24. a) Refer page no. 71 (Subtopic – Chordates)
b) The key difference between diploblastic and triploblastic animals is that diploblastic animals produce two germ layers excluding mesoderm and triploblastic animals produce all three germ layers – exoderm, mesoderm and endoderm.

25. Sea horse is a bony fish placed under the phylum chordates in the genus hippocampus. this is because they show the characteristics of a fish with a notochord and scaly body.
    While 1.jelly fish body show radial symmetry.
    2. their respiratory, circulatory and excretory organs are absent.
    3. it's nervous system is primitive, has only network of nerve cells.
    4. it's body show adjacent type of reproduction.
    5. it has large Center shape cavity and mouth cavity is absent.
26. Refer page no 67.
27. Octopus belongs to the phylum Mollusca while other belongs to Arthropoda.
28. Silver fish – Arthropoda
    Sea horse – Animalia (Pisces)
    Star fish – Echinodermata
    Jelly fish – Coelentrata
29. Two difference between *Amoeba* and *Paramecium*:-
    i.amoeba moves by using pseudopodia while the locomotion of paramecium is performed by using cilia.
    ii. amoeba usually has one nucleus but the paramecium has one or more nuclei.

    A similarity between *Amoeba* and *Paramecium* is:-
    i. they are protozoan, absorb and store food vacuole.

30. a) A – Centripedes
    B – *Hydra*
    C – Liver fluke
    D – Ascaris
    b) Platyhelminthes – liver fluke
    Arhtropoda – Centripedes
    Annelida- None
    c) i) None ii) Liver fluke
    d) i) Liver fluke ii) None
    e) Centripedes
    f) i) None ii) All