11th

Bio-Zoology

Complete Guide

Unit-1

The Living World

Success Starts Here

BY

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Bio-Zoology

Choose the correct Answer

1. A living organism is differentiated from non- living structure based on
   (a) Reproduction **(b) Growth** **(c) Metabolism** **(d) Movement**
2. A group of organisms having similar traits of a rank is
   (a) Species **(b) Taxon** (c) Genus (d) Family
3. Every unit of classification regardless of its rank is
   (a) Taxon (b) Variety (c) Species (d) Strain
4. Which of the following is not present on same rank?
   (a) Primata (b) Orthoptera (c) Diptera (d) Insecta
5. Which taxonomic aid gives comprehensive information about a taxon?
   (a) Taxonomic Key (b) Herbarium (c) Flora (d) Monograph
6. Who coined the term biodiversity
   (a) Walter Rosen (b) AG Tansley (c) Aristotle (d) AP de Candole
7. Cladogram considers the following characters
   (a) Physiological and Biochemical **(b) Evolutionary and Phylogenetic**
   (c) Taxonimic and systematic (d) None of the above
8. Molecular taxonomic tool consists of
   (a) DNA and RNA (b) Mitochondria and Endoplasmic reticulum
   (c) Cell wall and Membrane proteins (d) All the above
9. The word Taxonomy was coined by _____ .
   (a) Linnaeus **(b) Candolle** (c) Aristotle (d) John Ray
10. Father of Taxonomy is
    (a) Aristotle (b) Linnaeus (c) Bauhin (d) John Ray
11. _____is known as Father of Botany.
    (a) Aristotle (b) Linnaeus **(c) Theophrastus** (d) John Ray
12. _____is the father of modern taxonomy and found of systematics.
    (a) Linnaeus (b) Aristotle (c) John Ray (d) Bauhin
13. Three domain classification was proposed by
    (a) Carl woese (b) Ernst Haeckel (c) Whittaker (d) Theophrastus
14. Choose the odd one out.
    (a) Mule (b) Liger **(c) Red Panda** (d) Tigon
15. Book written by Darwin
    (a) Historia Generalis **(b) Origin of species** (c) Systema Naturae (d) Phylogeny of plants
16. _____was developed by Natural History Museum London.
    (a) SPIDA (b) ABIS (c) DAISY **(d) INOTAXA**
17. _____is called the bird man of India.
    (a) Dr. Subramaniam **(b) Dr. Salim Ali** (c) Whittaker (d) Varad Giri
18. Species Plantarum was written by
    (a) Linnaeus (b) Woese (c) Theophrastus (d) Darwin
19. _____established species as the ultimate unit of taxonomy. (He coined the term species).
    (a) Aristotle (b) Linnaeus **(c) John Ray** (d) Bauhin
20. Cladistics is based on
    (a) Natural characters (b) Reproductive organs (c) Molecular studies **(d) Phylogeny**
21. _____was the first to classify animals.
    (a) Aristotle (b) Linnaeus (c) Theophrastus (d) Haeckel

22. Five kingdom system of classification was given by
(a) Woese **(b) Whittaker** (c) Linnaeus (d) Cronquist

23. The concept of a c1adogram was introduced by
(a) Haeckel (b) Woese (c) Whittaker (d) John Ray

24. _____introduced the seven kingdom system of classification.
(a) John Ray **(b) Smith** (c) Bauhin (d) Linnaeus

25. Genus Felis refers to
(a) Dogs (b) Sparrow **(c) Cat** (d) Monkeys

26. "Historia Generalis Plantarum" was written by
(a) Linnaeus (b) Aristotle **(c) John Ray** (d) Bauhin

NEET Related Questions

1. The smallest taxon among the following is .....(PMT-94)
a.class b. order **c. species** d. genus

2. Taxonomically a species is ..... (PMT-94)
a.A group of evolutionary related population **b. A fundamental unit in the phylogeny of organisms**
c. Classical evolutionary taxonomy d. A community taken into consideration an evolutionary base

3. Species is .....
a. not related to evolution b. specific class of evolution
b. specific unit of evolution **d. fertile specific unit in the evolutionary history of a race**

4. Two words comprising the binomial nomenclature are ..... (DPMT-96)
a.Family & genus b. order & family **c. genus & species** d. species & variety

5. A group of plants or animals with similar traits of any rank is kept under .... (PMT-96)
a.species b. genus c. order **d. taxon**

6. Which of the following is the correct sequence in the increasing order of complexity ? (PMT-97)
a.molecules, tissues, community, population b.cell, tissues, community, population
c.**tissues, organisms, population,community** d.molecules, tissues, community, cells

7. New systematic and the concept of life was given by (BHU-98)
a.Huxley b. Odom **c. Elton** d. Linnaeus

8. Two organisms of same class but different families will be kept under the same (CET-98)
a.genera b. species **c. order** d. family

9. Which of the following will form a new species ? (PMT-98)
a.inter breeding **b. variations** c. differential reproduction d. none of the above

10. A community includes ..... (CET-98)
a. a group of same genera b. a group of same population
c. a group of individuals from same species **d. different populations interacting with each other**

11. Binomial nomenclature was given by ..... (BHU-97)
a.Huxley b. Ray c. Darwin **d. Linnaeus**

12. In classification the category below the level of family is ..... (CET-98)
a.class b. species c. phylum **d. genus**

13. Taxon is ..... (CET-2000)
a.species **b. unit of classification** c. highest rank in classification d. group of closely related

14. One of the following includes most closely linked organisms (PMT-2001)
a.**species** b. genus c. family d. class

15. Which of the following taxons cover a greater number of organisms ? (PMT-2001)
a. order b. family c. genus **d. phylum**

16. Inbreeding is possible between two members of ..... (AMU-2005)
a.order b. family c. genus **d. species**

17. Which of these is correct order of hierarchy? (WARDHA-2002)
a.**kingdom, division, phylum genus & species** b. phylum, division, genus & class
c. kingdom, genus, class, phylum & division d. phylum, kingdom, genus, species &class

18. Which is not a unit of taxonomic category? (BVP-2002)
a.series **b. glumaceae** c. class d. phylum

19. Which is the first step of taxonomy ? (MGIMS-2002)
a.nomenclature b. classification **c. identification** d. hierarchical arrangement

20. The five kingdom classification was given by ..... (BYP-2002)
a.**Whittaker** b. Linnaeus c. Copeland d. Haeckel

21. Taxon includes ..... (PMT-2002)
a.Genus and species b. kingdom and division c.**all ranks of hierarchy** d. none of the above

22. Binomial nomenclature refers to ..... (CET-2000)
a.Two names of a species b. one specific and one local name of a species
c.**two words for the name of a species** d. two life cycles ofa. organism

23. Carl Linnaeus is famous for ..... (GGSPU-2002)
a. coining the term 'systematics' **b. introducing binomial nomenclature**
c. giving all natural system of classification d. all of these

24. True species are .....
a.interbreeding b. sharing the same niche c. feeding on the same food **d. reproductively isolated**

25. The smallest unit of classification is ..... (GGSPU-2002)
a.**species** b. sub-species c. class d. genus

26. Who coined the term 'taxonomy' ? (BVP-2003)
a.**Candolle** b. Waksman c. Leuwenhoek d. Louis Pasteur

27. Basic unit of classification of organisms is ..... (CET-2003)
a.**species** b. population c. class d. family

28. The unit of classification containing concrete biological entities is .....(WARDHA-2003)
a.**taxon** b. species c. category d. order

29. Species are considereda. .....
a.**real basic units of classification** b. the lowest units of classification
c.artificial concept of human mind which cannot be defined in absolute terms
d.real units of classification devised by taxonomists

30. The living organisms can be unexceptionally distinguished from the non-living things on the basis of their ability for .....
a. interaction with the environment and progressive evolution **b. reproduction**
c. growth and movement d. responsiveness to touch

31. Taxonomic category arrange in descending order ..... (MH-01)
a. key b. hierarchy c. taxon **d. taxonomic category**

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

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

34. Which form of reproduction is correctly matched? (AIIMS 2007)
a. Euglena transvers binary fission b. Paramecium longitudinal binary fission
a. **Amoeba multiple fission** d. Plasmodium binary fission

35. The presence of two types of nuclei, a macronucleus and a micronucleus,is characteristic of protozoans are grouped under the class. (BHU 1994, 1999)
a. sporozoa b. flagellate c. sarcodina **d. ciliata**

36. Which class of protozoa is totally parasitic? (BHU 1994)
a. **sporozoa** b. mastigophora c. ciliate d. sarcodina

37. Reproduction in paramecium is controlled by (BHU 1999).
a. flagella b. cell wall **c. micronucleus** d. macronucleus

38. In the life cycle of plasmodium exflagellation occurs in (BHU 2007)
a. sporozoties **b. microgametes** c. macrogametes d. signet ring

39. Excretion in Amoeba occurs through (DPMT 1997)
a. lobopodia b. plasma membrane c. uroid portion **d. contractile vacuole**

40. Method of dispersal in Amoeba is (DPMT 1995)
a. locomotion **b. encystment** c. sporulation d. binary fission

41. Mode of feeding in free living protozoans is (DPMT 2007).
a. holozoic b. saprozoic **c. both (a) and (b)** d. none of these

42. Infection of Entamoeba is caused (UP- CPMT 1996, 1999).
a. by kissing b. by wearing clothes of patient **c. by contaminated food** d. none of these

43. Choose the correct statement
a. All reptiles have a three chambered heart. b. All Pisces have gills covered by a operculum
c. All mammals are viviparous **d. All cyclostomes do not posses jaws and paired fin**

44. Which of the following characteristics is mainly responsible for diversification of insects on land?
a. Segmentation b. Bilateral symmetry **c. Exoskeleton** d.Eyes.

45. The primitive prokaryotes responsible for the production of biogas from the ruminant animals Include the (2016)
a. Thermoacidophiles **b. methanogens** c. Eubacteria d. Halophiles.

46. Methanogens belong to (2016)
a. Dino flagellates b. Slime moulds c. Eubacteria d. Archaebacteria

2 Mark Questions

27) Differentiate between probiotics and pathogenic bacteria

Probiotic bacteria	Pathogenic bacteria
1. Beneficial bacteria	Disease-Causing bacteria
Eg: Bacteria present in curd	**Eg:** Bacteria causing cholera

28) Why mule is sterile in nature?

- Mules are produced by mating of **Male donkey and female horse**.
- Mules are sterile animals because they **cannot produce gametes due to problems in pairing** up of chromosomes.
- They have **odd number of chromosomes**.

29) What is biodiversity?

- The presence of a large number of species in a particular ecosystem is called **'biological diversity'** or in short' **biodiversity**'.
- The term biodiversity was first introduced by Walter Rosen (1985), and defined by E.D. Wilson

30) Define Taxonomy.

- Taxonomy = G. *taxis*- arrangement + *nomos*- law
- **Taxonomy** is the **science of arrangement of living organisms** along with **classification, description, identification, and naming of organisms** which includes all flora and fauna including microorganisms of the world.
- The word taxonomy was coined by **Augustin Pyramus de Candole (1813).**

31) How did Aristotle classify animals based on the presence or absence of red blood?

Based on the presence or absence of red blood he classified the animals into two as

a) **Enaima** with blood b) **Anaima** without blood as.

32) Mention the subdivisions of Five Kingdom classification.

- R.H. Whittaker (1969) proposed the Five kingdom Classification.
- The Kingdoms defined by him were **Monera, Protista, Fungi, Plantae, and Animalia**, based on the cell structure, mode of nutrition, mode of reproduction and phylogenetic relationships.

33) How do Bacteria differ from Eukaryotes?

Bacteria	Eukaryotes
1. No defined **nuclear, circular DNA seen.**	Defined nuclear with **nuclear membrane and linear chromosomes.**
2. **70s Ribosomes** are seen in the cell.	**80s Ribosomes** are seen in the cell.

34) Define Species.

- Species is the **basic unit of classification** in the taxonomic hierarchial system.
- It is a group of animals having **similar morphological features** (traits) and is reproductively **isolated to produce fertile off spring.**

35) What is binomial nomenclature?

- Biologists follow **universally accepted principles** to provide scientific names to known organisms.
- Each name has **two components**, a **generic name and a specific epithet.**
- This system of naming the organism is called **Binomial Nomenclature**
- This was **popularised by Carolus Linnaeus** and practised by biologists all over the world.

Eg. The **National Bird** (Indian Peafowl) – ***Pavo cristatus,***
The National Animal (tiger) – ***Panthera* tigris,**
The Tamil Nadu State bird (common Emerald dove) – ***Chalcophaps indica***.

36) What is Tautonymy?

- The practice of naming the animals in which the generic name and species name are the same is called Tautonymy.
- Eg: **Naja naja** (The Indian Cobra).

37) Name the classical taxonomical tools.

- Taxonomical keys
- Museum
- Zoological park
- Printed Taxonomical tools ,Marine parks

38) Name some Molecular taxonomic tools used.

- DNA barcoding
- DNA hybridization
- DNA Finger printing
- Marine parks
- Restriction Fragment Length Polymorphisms analysis.

39) Give examples of Cyber tools employed in taxonomic studies. (any two)

1. **ALIS** - Automated Leafhopper Identification system.
2. **DAISY** – Digital Automated Identification system.

40) What is INOTAXA

- **e-Taxonomic resources** - INOTAXA is **an electronic resource** for digital images and description about the species which was developed by Natural History Museum, London.
- INOTAXA means **IN**tegrated **O**pen **TAX**onomic **A**ccess

41) Name the books written by Linnaeus.

- Species Plantarum (1753)
- Systema Naturae (1758)

3 Mark Questions

42) List any five salient features of the family Feiidae.

Salient features of the family Felidae:

- They are commonly called as **wildcat family.**
- They have adaptations-to **detect and hunt prey.**
- They are **meat eaters** (carnivores).
- They have **cutting teeth to shear meat.**
- Canine teeth are **large and sharp.**
- Their sizes vary from **2 kgs to 300 kgs.**
- They have actue senses - **hearing, smell, vision, and touch.**
- They have well-padded toes with **powerful and flexible bodies.** Eg: Lion, Tigers, Cats.

43) What is the need for classification

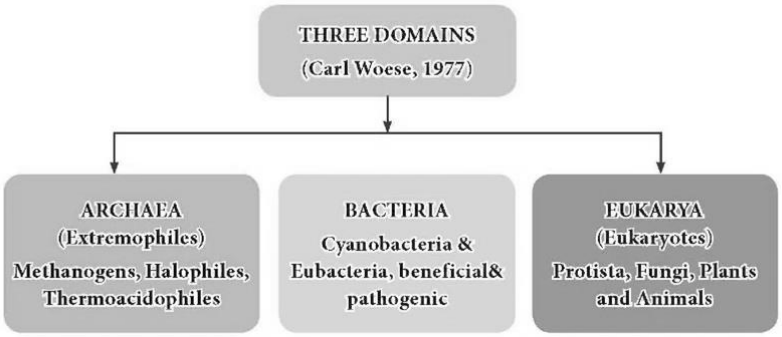
The basic need for classification is:

1) To identify and **differentiate closely related** species
2) To **know the variation** among the species
3) To **understand the evolution** of the species
4) To **create a phylogenetic tree** among the different groups
5) To **easily study** living organisms

44) What is Cladistics

- *Arranging organisms on the basis of their similar or derived characters which differ from the ancestral characters produced a phylogenetic tree or cladogram*
- 2. It is an evolutionary' classification which summarizes the genetic differences between all species in the **'phylogenetic tree'.**
- 3. Ernst Haeckal introduced the method of **representing evolutionary relationships with the help of a tree** diagram known as **cladogram**

45) Give a Schematic representation of Three domain classification.



46) What are the salient features of Three domain classification

- This classification was proposed by **Carl Woese** (1977) and **his co-workers.**
- They classified organisms **based on the difference in 16S rRNA genes.**
- The three domain system adds the taxon **'domain' higher than the kingdom.**
- This system emphasizes the separation of **Prokaryotes into two domains, Bacteria and Arachaea**, and all the **eukaryotes are placed into the domain Eukarya.**
- Archaea appears to have **more in common with the Eukarya than the Bacteria.**
  Archaea differ from bacteria in **cell wall composition** and differs from bacteria and eukaryotes in **membrane composition and rRNA types**

47) Mention the Subdivisions of the seven kingdom classification.

Cavalier-Smith revised' the six-kingdom system to Seven Kingdom system.

- The concept of **super kingdom was introduced** and revised to seven kingdom classification.
- The classification is divided into **two Super Kingdoms** (Prokaryota and Eukaryota) and **seven kingdoms, two Prokaryotic Kingdoms** (Eubacteria and Archaebacteria) and **five Eukaryotic Kingdoms** (Protozoa, Comista, Fungi, Plantae and Animalia).

48) What is genus? Mention the types.

- ***It is a group of closely related species which have evolved from a common ancestor.***
- In some genus there is **only one species** which is called as **monotypic genus**
  e.g. Red panda is the only species in the genus ***Ailurus*** : ***Ailurus fulgens***
- If there are **more than one species in the genus** it is known as **polytypic genus.**
- E.g.'cats' come under the Genus ***Felis***, which has a number of closely related species, ***Felis domestica*** (domestic cat), ***Felis margarita*** (jungle cat). ***Felis silvestris*** (wild cat)

Family:

- It includes a **group of related genera with less similarity** as compared to genus and species. Eg. the family **Felidae** includes the **genus *Felis*** (cats) and the **genus *Panthera*** (lions, tigers, leopards).

49) What is Phylogeny

Phylogeny - **Relationships among various biological species** based upon similarities and differences in their physical or genetic characteristics

50) What are Threatened species?

Threatened species - Species which are **susceptible to endangerment** in the near future

51) What is a phylogenetic tree?

- biologists initiated studies on the **evolutionary and genetic relationships** among organisms, which lead to **phylogenetic classification or cladistics.**
- It is based on - **common ancester between them.**
- **phylogenetic classification** - summarizes the **genetic differences between** all species in the **'phylogenetic tree'**

52) Distinguish between Shared character and Derived character

1. **In a cladogram**, a shared character is one that **two lineages have in common**
2. Derived character is one that **evolved in the lineage leading** up to a clade.

53) What is systematics?

1. The main criteria of systematics is **identifying, describing, naming, arranging, preserving** and **documenting** the organisms.
2. Evolutionary history of the species and the **environmental adaptations and interrelationship** between species are also being investigated in systematics

54) What are extremophiles?

- It **single celled organisms, the prokaryotes** which have the ability to grow in extreme conditions like **volcano vents, hot springs and polar ice caps**, hence are also called **extremophiles.**
- They are capable of **synthesizing their food without sunlight and oxygen** by utilizing **hydrogen sulphide** and other chemicals from the volcanic vents. Some of them are,
  - **Methanogens** - produced methane
  - **Halophiles**- live in salty environments
  - **Thermoacidophiles** - live in acidic environments and at high temperatures.

55) What is the Significance of Bhupathy's purple frog?

1. Purple pig-nosed Frog was **discovered in the Western Ghats.**
2. It has shiny purple skin and spends its **entire adult life underground.**
3. It is called Bhupathy's purple frog by the scientists in memory of **Subramaniam Bhupathy** a respectable herpetologist who lost his life is the Western Ghats

56) What is the Significance of Thermus aquatics?

- ***Thermus aquatics*** *is a bacterium which can* ***tolerate high temperatures.***
- *The first* ***DNA polymerase enzyme*** *was isolated from* ***T. aquaticus*** *it is used in* ***PCR*** *(Polymerase Chain Reaction) for* ***DNA amplification.***

57) How can we save endangered species?

Saving Endangered Species:

- The greatest threat to survival is destruction of habitat. It is important to conserve the habitat or the special places where the species live.
- The animals must have places to find food, shelter, and care for their young ones.
- Setting up Zoological parks and nature reserves will help to conserve the species.

- Mutual agreement between countries can help to save forests and species in coastal waters.
- Scientists are setting up gene banks to conserve animals of a species.
- Several organisations are also working for the protection of endangered species.
- Hot spots/areas with high biodiversity must be protected from human intervention to conserve the animal and plant species.

58) Why are sparrows listed as endangered species?

Reasons for reduction in Population of sparrows:

- Absence of native plants which provide habitats (shelter, insects as food etc.)
- Grocery stores being replaced with Supermarkets (gunny bags were pecked by sparrows for grains earlier.)
- Cell phone radiation from Towers. Sparrow population is disappearing. fast. Thus it is important to conserve sparrows which is becoming endangered because every animal is an important link is an ecosystem.

59) Reproduction cannot be considered as a character to define living organism. Do you agree with this statement

- There are many organisms like the Mules, worker bees etc.
- which are sterile but they show the characteristics of living organism.
- Hence, Reproduction cannot be considered as a character to define living organisms

60) Name the kingdom in Five Kingdom Classification in which organisms lack a nuclear membrane.

- **Kingdom Monera** includes bacteria which are prokaryotic organisms lacking a nuclear membrane.

61) List out the limitations of Aristotle's classification

- **many organisms were not fitting** into his classification.
  Eg. Tadpoles of frogs are **born in water and have gills** but when they became into **adult frogs they have lungs** and can **live both in water** and **land.**
- Aristotle classified organisms based on locomotion, hence, **birds, bats, and flying insects were grouped together** based one single characteristic feature, the **flying ability.**
- On other hand the **ostrich, emu and penguin are all birds but cannot fly.**
- So Aristotle would **not have classified them as birds.**

63) What are the characters of organisms in Five kingdom classification

Features	Monera	Protista	Fungi	Plantae	Animalia
Cell type	Prokaryotic	Eukaryotic	Eukaryotic	Eukaryotic	Eukaryotic
Cell wall	Non-cellular	Present in some	Present	Present	Absent
Body organisation	Cellular	Cellular	Multicelluar Tissue	Tissue Organ	Tissue, Organ system
Mode of nutrition	Autotrophic Heterotrophic	Autotrophic Heterotrophic	Heterotrophic	Autotrophic	Heterotrophic

5 Mark Questions

61) What is the role of Charles Darwin in relation to concept of species

- Charles Darwin visited the Galapagos Islands as a naturalist on a **five-year voyage around South America.**
- He found 13 types of **"Mockingbirds"** on the same island but in different habitats.
- He brought back the different types and studied them.
- He found that only the beak pattern and usage was different in these **different varieties.**
- This made him think that **adaptation to suit a particular habitat** (for food) had brought about such changes in these birds which- lived in different habitats.
- After some time they **evolved into, different species.**
- The formation of **new species or 'speciation'** is brought about by Natural selection (**Nature being the deciding factor).**
- Hence Darwin gets this credit of attempting to explain how **species evolved and role of Natural selection.**
- The birds are referred to as **Darwin's finches.**
- In 1859 Charles Darwin in his book **Origin of species** explains the evolutionary connection of species by the process of natural selection.

62) Why elephants and other wild animals are entering. into human living area?

- Man is **destroying forests.**
- Deforestation is increasing due to **rapid urbanisation and increase in human population.**
- When habitats are destroyed the animals living there **do not find food and shelter.**
- They tend to wonder outside in **search of food or shelter and enter into human living area.**
- **Pollution is another major factor** due to which availability of water bodies with clean water is decreasing.
- The reality is that we have **entered into the habitats of animals**

63) What is the difference between a Zoo and Wild Life Sanctuary

S.No	ZOO	Wildlife sanctuary:
	• A zoo is a place where animals are held in **capitivity and Public** is allowed to visit and see the animals. • It is a **artificially created habitat.**	• A wild life sanctuary is a large area with natural surrounding where the animals are **allowed to roam freely.** • **A boundary wall Barrier** is in place to ensure that humans cannot enter the area. • The animal gets the feel of a natural surrounding.
	• A zoo can sell, buy, breed or trade animals.	• In many cases sanctuaries focus on maintaining and increasing the population of a particular species. • Eg: **Kaziranga sanctuary in Assam focuses on Rhinoceros population**

64) Can we use recent molecular tools to identify and classify organisms

Molecular taxonomical tools

- Technological advancement has helped to evolve **molecular taxonomical tools** from classical tools to molecular tools.

- The **accuracy and authenticity is more significant** in the molecular tools.
- The following methods are being used for taxonomical classification.
- **Molecular techniques and approaches are :**

1. **DNA barcoding** (short genetic marker in an organism's **DNA** to identify it as belonging to a particular species),
2. **DNA hybridization** (measures the degree of genetic similarity between pools of DNA sequences)
3. **DNA fingerprinting** (to identify an individual from a sample of DNA by looking at unique patterns)
4. **Restriction Fragment Length Polymorphisms** (RFLP) analysis (difference in homologous DNA sequences that can be detected by the presence of fragments of different lengths after digestion of the DNA samples)
5. **Polymerase Chain Reaction** (PCR) sequencing (to amplify a specific gene, or portion of gene,)

65) Explain the role of Latin and Greek names in Biology

- Knowledge of prefixes and suffixes in biology makes it easy to **understand unfamiliar words.**
- Biology involve a lot of descriptive words and it is easy to **adopt names from Greek and Latin.**
- Many words used in Biology are **derived from Greek or Latin.**
  Eg: 'autos' is greek word which means self.
- Autophagy means **self-destruction.**
- Autotroph means manufacture of own food.
- 'bis' is a Latin word which means **twice.**
- Binary fission, Bicuspid valve are Biological terms based on this **Meaning:**
- **Binary fission** - Divide in two
- **Bicuspid** - Two flaps
- Usage of Greek and Latin words also finds universal application.

66) List the rules of nomenclature as given by ICZN?

Rules of Nomenclature:

1. The scientific name should be **italicized in printed** form and if handwritten, it **should be underlined separately.**
2. The generic name's (*Genus*) **first alphabet should be in uppercase.**
   The specific name (*species*) **should be in lowercase.**
3. The scientific names of any **two organisms are not similar.**
4. The name or abbreviated name of the scientist who first publishes **the scientific name may be written after the species name** along with the year of publication.
   Eg. Lion-***Felis leo*** Linn., 1758 or ***Felis leo*** L., 1758.
5. If the species name is framed after any person's name the **name of the species shall end with i, ii or ae.**
6. For example, a new species of a **ground- dwelling lizard** (**Cyrtodactylus**) has been discovered and named after Scientist Varad **Giri, *Cyrtodactylus varadgirii*.**

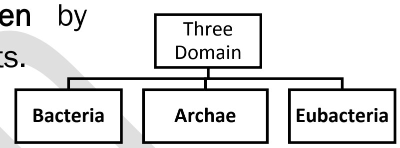
67) Write a note on three Domain system of classification?

- This classification was proposed by **Carl Woese** (1977) and **his co-workers.**

- They classified organisms **based on the difference in 16S rRNA genes.**
- The three domain system adds the taxon **'domain' higher than the kingdom**.
- This system emphasizes the separation of **Prokaryotes into two domains, Bacteria and Arachaea**, and all the **eukaryotes are placed into the domain Eukarya**.
- Archaea appears to have **more in common with the Eukarya than the Bacteria**.
- Archaea differ from bacteria in **cell wall composition** and differs from bacteria and eukaryotes in **membrane composition and rRNA types**.

1. Domain Archaea

- It **single celled organisms, the prokaryotes** which have the ability to grow in extreme conditions like **volcano vents, hot springs and polar ice caps**, hence are also called **extremophiles.**
- They are capable of **synthesizing their food without sunlight and oxygen** by utilizing **hydrogen sulphide** and other chemicals from the volcanic vents. Some of them are,



  - **Methanogens** - produced methane
  - **Halophiles-** live in salty environments
  - **Thermoacidophiles** - live in acidic environments and at high temperatures.

2. Domain Bacteria

- **Bacteria are prokaryotic,**
- They do not have **definite nucleus**
- have a **circular chromosomes in DNA** and **do not have histones associated** with it.
- They **do not possess membrane bound organelles** except for ribosome (70S type).
- Their **cell wall contains peptidoglycans.**
- Many are **decomposers**, some are **photo-synthesizers** (Autotrophic) and few cause diseases(**Pathogen**).
- There are beneficial **probiotic bacteria**.
- **Cyanobacteria** - are **photosynthetic blue green algae** which produce oxygen.
- **Role :** changes of **atmospheric oxygen levels** from anaerobic to aerobic during the early geologic periods.
- **Curd** - best sources of which are friendly bacteria that can improve our health. e.g. ***Lactobacillus sp.*** **(Probiotics** – live bacteria and yeast which are good for health)

3. Domain Eukarya (Eukaryotes)

- They have **true nucleus and membrane bound organelles**.
- DNA is arranged as a **linear chromosome** in nucleus **with histone proteins,**
- **Ribsosomes of 80S type** in the **cytosol** and **70S type in the chloroplast and mitochondria**.
- Animals are classified under **kingdoms**, namely, **Protista, Fungi, Plantae and Animalia.**
- 1987, <u>Cavalier-Smith</u> revised the **six kingdom system** to **Seven Kingdom system.**

68) Write a note on the classical taxonomical tools

Taxonomical Keys:

- Keys are based on **comparative analysis of the similarities and dissimilarities** of organisms.
- There are **separate keys** for different taxonomic categories.

Museum:

- It have **collection of preserved plants and animals** for study and ready reference.
- Specimens of both **extinct and living organisms** can be studied.

Zoological parks:

- These are places where **wild animals are kept in protected environments** under human care.
- It enables us to **study their food habits and behaviour.**

Marine parks:

- Marine organisms are maintained in protected enviroments.

Printed taxonomical tools

- Consist of **identification cards, description, field guides and manuals.**

11Th Biology

Lesson -2

And all lesson

Complete Notes will

Upload Soon....

For Complete notes Contact

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11th

BIOLOGY

Bio-Botany

Complete Guide

Unit-1

The Living World

Success Starts Here

BY

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Bio-Botany
Lesson : 1 The Living World

Textbook Evaluation :

1. **Which one of the following statement about virus is correct?**
   (a) Possess their own metabolic system. (b) They are facultative parasites
   (c) They contain DNA or RNA (d) Enzymes are present
2. **Identify the incorrect statement about the Gram positive bacteria**
   (a) Techoic acid absent (b) High percentage of peptidoglycan is found in cell wall
   (c) Cell wall is single layered **(d) Lipopolysaccharide is present in cell wall**
3. **Identify the Archaebacterium**
   (a) *Acetobacter* (b) *Erwinia* (c) *Treponema* **(d) *Methanobacterium***
4. **The correct statement regarding Blue green algae is**
   (a) **lack of motile structures** (b) presence of cellulose in cell wall
   (c) absence of mucilage around the thallus (d) presence of floridean starch
5. **Identify the correctly matched pair**
   (a) Actinomycete - (a) Late blight
   (b) Mycoplasma - (b) Lumpy jaw
   (c) Bacteria - (c) Crown gall
   (d) Fungi - (d) Sandal spike

Additional important One Mark

6. _____ is a basic unit of life.
   (a) Atoms (b) Compounds (c) Soils **(d) Cell**
7. Earth was formed around _____ billion years ago.
   (a) 3.3 (b) 5.6 **(c) 4.6** (d) 5.9
8. According to Mora et.al., in 2011, the number of estimated species on Earth is _____
   (a) 8.7 Million (b) 9.7 million (c) 7.7 million (d) 9.7 million
9. Which of the following is NOT a prokaryote?
   (a) Bactetria (b) Blue green algae **(c) Oedogonium** (d) Nostoc
10. Which of the following organism undergoes regeneration?
    (a) Spirogyra **(b) Planaria** (c) Yeast (d) Aspergillus
11. Vaccination for small pox was discovered by ·
    (a) W.M. Stanley (b) Adolf Mayer (C) Robert Koch **(d) Edward Jenner**
12. Who coined the term 'Bacteriophage'?
    (a) F.W. Twort **(b) d'Herelle** (c) Ivanowsky (d) Robert Gallo
13. The size of TMV is ———
    (a) 300 x 20 mm (b) 300 X 200 µm **(c) 300 x 20 nm** (d) 300 X 20 A
14. One nanometer equals to .....metres.
    (a) 10^{-9} (b)10^{-6} (C)10^{-5} (d)10^{-12}
15. Which is a non-living character of viruses?
    (a) Undergoes mutation (b) Host-specific **(c) Crystallized** (d) Irritability
16. 10.According to David Baltimore, the viruses are classified into ..... classes.
    (a) 6 (b) 5 **(c) 7** (d) 8

17. Identify the criteria not used in classifying viruses by Baltimore ..... .
(a) ss (or) ds (b) use of RT **(c) capsid** (d) sense or antisense

18. Viruses with dsRNA is ....
(a) Toga viruses (b) Retroviruses **(c) Reo viruses** (d) Rhabdo viruses

19. Which of the plant virus contains DNA as genome?
(a) Tobacco mosaic virus **(b) Cauliflower mosaic virus**
(c) Sugarcane mosaic virus (d) Cucumber mosaic virus

20. Parvo viruses have ....
(a) ssDNA (b) dsDNA (c) ssRNA (d) dsRNA

21. Molecular weight of TMV is .....dalton.
(a) 39×10^{6} (b)39×10^{-6} (c)39×10^{9} (d)39×10^{-9}

22. Approximate number of capsomeres is TMV is
(A) 3120 (b)1203 **(c)2130** (d) 3021

23. The empty proteincoat left outside after penetration is
(A) host **(b) ghost** (c) capsid (d) capsomeres

24. The genome of viroid is
(a) Linear ssRNA (b) dumb-bell shaped ss RNA
(c) Circular ss RNA (d) Linear ds RNA

25. Viriods were discovered by
(a) Ivanowsky (b) Robert Gallo **(C)Diener** (D)d'Herelle

26. Mad cow disease is caused by
(a) Viriods (b) Virusoids **(c) prions** (d) viruses

27. Match the following

1. Adenoviruses	dsRNA
2. Retro viruses	+sense ssRNA-RT
3. Reo virus	dsRNA
4. Parvo virus	+sense ss DNA

28. Identify the correct sequence regarding lytic cycle of viruses.
(a) Penetration (B) Adsorption (C) Assembly (D) Synthesis
(a) BADC (b) CABD (c) BDAC (d) ADBC

29. Mycophages infect ..... .
(a) *blue*green algae (b) bacteria **(c) fungi** (d) cyanobacteria

30. Rice tungro is caused by ..... .
(a) fungi (b) bacteria (c) mycoplasma **(d) viruses**

31. Father of Botany .....
(a) Aristotle **(b) Theophrastus** (c) Leder berg (d) Whittaker

32. Three kingdom classification was proposed by.....
(a) Copeland (b) Theophrastus (c) Linnacus **(d) Haeckel**

33. Which is not a part of five kindgom classification?
(a) Viruses (b) Monera (c) Protista (d) Mycoplasma

34. Six kingdom classification was proposed by .....
(a) Haeckel (b) Copeland (c) Woese **(d) Cavalier-Smith**

35. Ruggerio et al., in 2015 proposed ..... kingdom classification.
(a)5 (b)6 **(c)7** (d)8

36. ..... is a new kingdom in seven kingdom classification.
(a) Eubacteria (b) Plantae **(c) Chromista** (d) Archaebacteria

37. Actinomycetes comes under .....kindgom.
(a) fungi (b)chromista **(c) monera** (d) protista

38. The sourness of curd is due to .....
(a) acetic acid (b) galactic acid **(c) lactic acid** (d) lactone

39. Who is the founder of Modern Bacteriology?
(a) Aristotle **(b)Robert Koch** (c) Pasteur (d) Linnaeus

40. The term bacterium was coined by ..... .
(a) Stanley **(b) Ehrenberg** (c) Gram (d) Koch

41. Plasmids were discovered by ....
(a) Ehrenberg (b) H.Bergy **(c) Joshua Lederberg** (d) Koch

42. Genophore is seen in ..... .
(a) Amoeba **(b) Cyanobacteria** (c) Chlamydomonas (d) Euglena

43. Number of domains of life are there according to Carl Woese ..... .
(a) 3 (b)2 (c)4 (d) 5

44. Which is not a component of bacterial cell?
(a) Mesosomes (b) Glycocalyx (c) Polysomes **(d) Histones**

45. The most abundant polypeptide in bacterial cell wall is____
(a) Chitin (b) Amylopectin **(c) Porin** (d) Pectin

46. Extra chronmsornal element in bacterial cells are
(a) Plasmids (b) mesosomes (c) histones (d) genophores

47. Bacteriocins are found in
(a) geonophore **(b)plasmids** (c) nucleoids (d)mesosomes

48. Colour revealed by Gram positive bacteria after Gram staining is
(a) red (b) indigo **(c) dark violet** (d) blue

49. How mnay number if basak body rings seen in the flagella of Gram negative bacteria?
(a) 2 (b) 9 **(c) 4** (d) 1

50. Capnophilic bacteria require _____ for growth
(a) O_2 (b) CO **(c) CO_2** (d) O_3

51. The pigment present in green sulphur bacteria is
(a) Bacteriaoviridin **(b) Bacteriochlorophyll** (c) cholorophylla (d) Xanthophyll

52. The hydrogen donor of purple sulphurbactena is.....
(a) H_2s **(b) thiosulphate** (c) ethanol (d) acehc acid

53. *Campylohacter* is a .....
(a) obligate aerobe (b) obligate anaerobe **(c) capnophilic** (d) aerobe

54. *Mycobacterium* is a ..... .
(a) parasite (b) symbiont (c) saprophyte (d) free-living

55. Which is *the* most common mode of asexual reproduction in bacteria?
(a) Endospore formation **(b) Fission** *(c)* Budding (d) Conidia

56. —— are thick walled resting spores
(a) Aplanospores **(b) Endospores** (c) Conidia (d) Zoospore

57. In which of *the* following method genetic recombination does not occur?
(a) Generalised transduction (b) Conjugation (c) Transformation **(d) Fission**

58. During conjugation in bacteria, which of thw following is transferred from donor to receipient cell?
(a) R factor **(b) F factor** (c) Ti factor (d) Ri factor

59. Griffith used ..... for his experiment.
(a) rat (b) rabbit **(c) mice** (d) monkey

60. Transformation in bacteria was demonstrated by _____
(a) Lederberg (b) Zinder (c) Edward **(d) Griffith**

61. Lederberg studied transduction in _____ bacterium
(a) Diplococcus pneumoniae (b) Streptococcus **(c) Salmonella typhi** (d) Escherichia coli

62. Bacteria used in the curing of tea is ..... .
(a) *Mycococcuscandisans* (b) *Escherichia coli*
(c) *Acetobacter aceti* (d) *Streptococcus lactis*

63. Syphilis is caused by ..... .
(a) *Mycococcuscandisans*. **(b) *Treponema pallidum***
(c) *Yersinia pestis* (d) Mycobacterium*leprae*

64. *Methanohacterium*is ....
(a) Cyanobacteria (b) Malobacteria (c)Eubacteria **(d) Archaebacteria**

65. ..... Is NOT a phycobiont in lichens.
(a) Gloeocapsa **(b)Dermacarpa** (c) Scytonema (d)Nostoc

66. Red sea is red colour due to
(a) Dermacarpa sps **(b) Trichodesmium sps** (c) Scytonema sps (d) Gloeocapsa sps.

67. Filamentous trichome is the plant body of
(a) Chroococcus (b) Gloeocapsa **(c) Nostoc** (d) Oscillatoria

68. Stromatolites are the colonies of cyanobacteria bind with .....
(a) calcium carbonate (b) calcium hydroxide (c) magnesium sulphate (d) calcium silicate

69. .....sps. is an endophyte in coralloid roots of *Cycas.*
(a) *Gloeocapsa* (b) *Scytonema* **(c) *Nostoc*** *(d)Azolla*

70. Myxophyccae refers to ——
(a) Algae (b) Fungi (c) Archaebacteria **(d) Cyanobacteria**

71. _____ is used in single cell protein
(a) Spirulina (b) Azolla (c)Dermacarpa (d) Nostoc

72. _____ is a pleomorphic organism.
(a) Fungi **(b) Mycolasma** (c) Bacteria (d) Algea

73. Pleuropneumonia is caused by ____
(a) Bacteria (b) Fungi **(c) Mycoplasma** (d) Viruses

74. _____ is also called as Ray fungi.
(a) Basidiomycetes (b) Ascomycetes **(c)Actinmycetes** (d) Deuteromycetes

75. Earthy odour of soil after rain is due to ——
(a) Basidiomycetes (b) Ascomycetes **(c) Actinomycetes** (d) Deuteromycetes

76. Viruses that attack blue green algae are called as .....
(a) Mycophages (b) Phycophages **(c) Cyanophages** (d) Bacteriophages

77. Cell membrane of Archaebacteria has .....
(a) glycine and isopropyl ethers (b) glycerol and isobutyl ethers
(c) glycerol and isopropyl ethers (d) celluose and isobutyl ethers

78. Which is a true bacteria?
(a) *Halobacterium* (b) *Thermoplasma* (c) *Methanobacterium* **(d) Azotobacter**

79. Study of fungus is called as.....
(a) phycology **(b) mycology** (c) algology (d) biology

80. Who is considered as the founder for mycology?
(a) K.C.Mehta (b) G C Ainsworth **(c) P.A.Micheli** (d) T.S.sadasivan

81. Asexual phase of fungi is calledas .....
(a) telomorph (b) holomorph (c)metamorph **(d) anamorph**

82. In which mycelium, the hypae are arranged loosely?
(a) Prosenchyma (b) Plectenchyma (c) Pseudoparenchyma (d) Arenchyma

83. Number of nuclei in coenocytic mycelium
(a) 2 **(b) many** (c) nil (d) 9

84. Thallospores are produced by
(a) *Aspergillus* **(b) *Erysiphe*** (c) *Saccharomyces* (d) *Fusarium*

85. In *Agaricus,* ..... type of sexual reproduction occurs. .
(a) spennatization **(b) somatogamy** (c) oogamy (d) isogamy

86. *Albugo* belongs to ..... .
(a) oomycetes (b) zygomycetes (c) ascomycetes (d) deuteromycete

87. Fungi growing on dung is called as .....
(a) Mold fungus (b) Saprophytes (c) Capnophilous **(d) Coprophilous**

88. Coprophilous belongs to .....group.
(a) basidiomycetes (b) ascomycetes **(c) zygomycetes** (d) oomycetes .

89. Which of the following is a coprophilous fungi?
(a) *Albugo* (b) *Entomophthora* (c) *Rhizopus* **(d) *Pilobolus***

90. Cup fungus belongs to .....
(a) zygomycetes (b) oomycetes **(c) ascomycetes** (d) actinomycetes

91. Which group of fungus is called as Sac fungi?
(a) Deuteromycetes (b) Zygomycetes **(c) Ascomycetes** (d) Oomycetes

92. Number of ascospores in an asci is ....
(a) 2 (b) 4 (c) 6 **(d) 8**

93. Shape of perithecium is ....
(a) cup shaped **(b) flask shaped** (c) completely closed (d) open type

94. ..... are called as Club fungi.
(a) Ascomycetes (b) Zygomycetes **(c) Basidiomycetes** (d) Deuteromycetes

95. Parasexual cycle is observed in ——~—
(a) basidiomycetes (b) zygomycetes **(c) deutcromycetes** (d) Ascomycetes

96. Which is called as imperfect fungi?
(a) Basidiomycetes (b) Zygomycetes **(c) Deuteromycetes** (d) Ascomycetes

97. In basidiomycetes, clamp connections are formed to maintain .....condition
(a) monokaryotic (b) coenocytic **(c) dikaryotic** (d) zygotic

98. ..... is a single celled fungus used in dairy industry.
(a) Volvariella (b) Agaricus (c) Penicillin **(d) Yeast .**

99. Ergot alkaloids are produced by .....
(a) *Penicilliumnotatum* (b) *Acremoniumchrysogenum*
(c) Claviceps purpurea (d) *Penicilliumgriseofulvum*

100. Kojic acid is produced by .....
(a) *Aspergillus terreus* (b) *Aspergillus niger* **(c) *Aspergillus oryzae*** (d) Agaricus*bisporus*

101. .....infest dried fi doo s and produ .
a) *Aspergillus flavus* (b) *Amanita verna* (c) *Amanita phalloides* (d) *Rhizopus*

102. Rust of wheat is produced by
(a) *Albugo candida* **(b) *Puccinia graminis*** (c) *Candida albicans* *(d) Colltotrichum sps*

103. VAM is a type of .....
(a) Endomycorrhiza (b) Ectomycorrhiza (c) Ectendomycorrhiza (d) Endectomycorrhiza

104. Algal partner of lichen is
(a) phycobiant (b) phytobiont (c) mycobiont **(d) both (a) & (c**

105. Asexual reproduction by *Soredia* is seen in
(a) fungi **(b) lichen** (c) mycorrhiza (d) algae

106. Saxicolous lichen grow on
(a) ground (b) bark (c) wood **(d) rock**

107. _____ is a sexual method of reproduction.
(a) Binary fission (b) Budding (c) Conidia **(d) Gametangial contact**

108. Vaccination for small pox was discovered by ____.
(a) d' Herelle **(b) Edward Jenner** (c) Robert Gallo (d) F.W. Twort

109. Viruses were classified into seven classes by _____.
(a) David Baltimore (b) Twort (c) Ehrenberg (d) Alexopoulos

110. Identify the criteria not used for classification of viruses.
(a) –ss or – ds (b) Use of RT (c) (+) RNA or (–) RNA **(d) Reproduction**

111. A virus with ds DNA.
(a) Pappo viruses (b) Reo viruses **(c) Adeno viruses** (d) Retro viruses

112. TMV has a molecular weight of _____Daltons.
(a) 39×10^6 (b) 38×10^5 (c) 39×10^7 (d) 39×10^{10}

113. Match the following :

1. Toga Virus	(a) Mottling
2. TMV	(b) Eaters of bacteria
3. Phage	(c) Cauliflower Mosaic Virus
4. Ribo virus	(d) ss RNA

(a) 1 - c, 2 - d, 3 - a, 4 – b (b) 1 - b, 2 - c, 3- d, 4 – a (c) 1 - a, 2 - b, 3 - c, 4 – d **(d) 1 - d, 2 - a, 3 - b, 4 - c**

114. Identify the sequence involved in lytic life cycle.
(A) Pinning (B) Maturation (C) Synthesis (D) Ghost
(a) A B C D **(b) A D C B** (c) D A C B (c) A C D B

115. Mad cow disease is caused by _____.
(a) Prions (b) Virion (c) Viroid (d) Phage

116. _____is considered to be a new kindgom.
(a) Protista **(b) Chromista** (c) Monera (d) Plantae

117. The classification published in recent times was given by _____.
(a) Carlwoese **(b) Ruggero et al** (c) Whittaker (d) Copeland

118. Founder of modern Bacteriology_____.
(a) Koch (b) Griffith (c) Lederberg (d) Gram

119. Bacteria was first discovered by a _____ scientist.
(a) German **(b) Dutch** (c) French (d) American

120. Identify the correct statement regarding bacterial genome.
A) Nucleoid B) Contains histone C) Linear D) Absence of nuclear membrane

(a) A and D (b) A and B (c) C and D (d) All the above

121. _____ are obligate aerobes.
(a) *Streptococcus* (b) *Clostridium* **(c) *Micrococcus*** (d) *E. Coli*

122. Griffith demonstrated Transformation in _____.
(a) 1928 (b) 1930 (c) 1975 (d) 1900

123. Food poisoning is caused by _____.
(a) *Yersinia* **(b) *Clostridium*** (c) *Treponema* (d) *Vibrio*

124. _____ was awarded a Nobel prize for his work on TMV.
(a) Jenner (b) Mayer **(c) W.M. Stanley** (d) Robert Gallo

125. _____ shows cuboid symmetry.
(a) TMV (b) Bacteriophage **(c) Herpes virus** (d) Influenza

126. The base plate of T_4 phage has _____ tail fibres.
(a) 5 (b) 4 **(c) 6** (d) 8

127. Lysozyme is secreted by phage during _____ .
(a) Adsorption (b) Synthesis **(c) Penetration** (d) Maturation

128. _____ is a capnophilic bacteria.
(a) *Campylobacter* (b) *Chlorobium* (c) *Chromatium* (d) *Clostridium*

129. _____is a disease affecting animals.
(a) Scab **(b) Anthrax** (c) Ring rot (d) Canker

130. _____is found in corolloid roots of *Cycas*.
(a) *Dermacarpa* **(b) *Nostoc*** (c) *Scytonema* (d) *Chara*

131. A marine cyanobacterial species_____.
(a) *Trichodesmium* (b) *Gloeocapsa* (c) *Nostoc* (d) *Cycas*

132. The organisms isolated from pleural fluid of cattle _____.
(a) Actinomycetes (b) Virus (c) Phage **(d) Mycoplasma**

133. Nitrogen fixation in non leguminous plants is done by_____.
(a) *Rhizobium* (b) *Alnus* **(c) *Frankia*** (d) *Streptomyces*

134. Yellow powder which saved lives of soldiers in world war II was_____.
(a) Streptomycin (b) Aureomycin **(c) Penicillin** (d) Bacitracin

135. _____is considered as founder of mycology.
(a) P.A. Micheli (b) Webster (c) Blackley (d) Ainsworth

136. Spermatization is a sexual mode of reproduction in _____.
(a) *Rhizopus* **(b) *Neurospora*** (c) *Ascomycetes* (d) *Penicillium*

137. Sac fungi refers to_____.
a) Ascomycetes (b) Zygomycetes (c) Basidiomycetes (d) Deuteromycetes

138. Basidiomycetes do not possess this feature.
(a) Clamp connection (b) Club Fungi (c) Dolipore septum **(d) Lack sexual reproduction**

139. A plant growth promoter got from fungi is _____.
(a) Rennet **(b) Gibberellin** (c) Ergot (d) Griseofulvin

140. Monotropa derives nutrition by_____.
(a) Root Nodules (b) Lichens **(c) Mycorrhizae** (d) Roots

141. **_____are considered as pollution indicators.**
(a) Mycorrhiza (b) Actinomycete **(c) Lichens** (d) Cyanobacteria

142. Living organisms constitute _____ .
(a) Living world (b) Non-living world (c) Animal kingdom (d) Plant kingdom

143. Living things are made of _____ .
(a) Organisms (b) Atoms (c) Organs **(d) Cells**

144. Sum total of constructive reactions is called as _____ .
(a) Anabolism (b) Catabolism (c) Metabolism (d) Embolism

145. Sum total of destructive reactions is called as _____ .
(a) Metabolism **(b) Catabolism** (c) Embolism (d) Anabolism

146. A multicellular organism grows by _____ .
(a) budding **(b) cell division** (c) fission (d) spore formation

147. Organisms grow by _____ .
(a) cell division (b) spore formation (c) fragmentation (d) vegetative propagation

148. Increase in body mass is considered as _____ .
(a) cell division (b) homeostasis (c) reproduction **(d) growth**

149. _____ multiply and spread very fast by producing millions of asexual spores.
(a) Bacteria (b) Pteridophytes **(c) Fungi** (d) Sea weeds

150. Some fungi, filamentous algae and the protonema of mosses multiply by _____ .
(a) fission (b) fertilization (c) pollination **(d) fragmentation**

151. Yeast and *Hydra* reproduce by _____ .
(a) Budding (b) Fission (c) Spore formation (d) Vegetative propagation

152. _____ is the building block of all living things.
(a) Cells (b) Organs (c) Atoms (d) Compounds

153. Detection of changes in their living place by organisms is called _____ .
(a) Interactions **(b) Consciousness** (c) Autotropic (d) Meterotropic

154. _____ are superior among all living things as they have an additional ability of self-consciousness.
(a) Animals (b) Plants **(c) Humans** (d) Monera

155. Bacteriophage varies in size from _____ .
(a) 10-100nm (b) 1-10nm (c) 50-500nm (d) 20-40nm

156. Viruses that cause diseases in fungi are called _____ .
(a) Cyanophages (b) Bacteriophages (c) Lactophages **(d) Mycophages**

157. Viruses that attack blue green algae or cyanobacteria and cause diseases are called _____ .
(a) Bacteriophages **(b) Cyanophages** (c) Mycophages (d) Lactophages

158. Virus that infects bacteria is called _____ .
(a) Mycophage (b) Lactophage **(c) Bacteriophage** (d) Cyanophage

159. The cancer causing viruses are also called _____ .
(a) Oncogenic viruses (b) Corona viruses (c) HIV (d) Mycoviruses

160. The term bacteria was first used by _____ .
(a) Stanley (b) Pasteur (c) Hooke **(d) Ehrenberg**

161. Bacterial cell wall contains _____ .
(a) peptidoglycan (b) glucose (c) flagellin (d) chitin

162. Which Gram negative bacterium caused Duodenal and Gastric ulcers?
(a) *Helicobacter Pylori* (b) *Helicobacter Vibrio* (c) *E.Coli* (d) *Haemophillus*

163. _____ is a thermophilic gram negative bacteria.
(a) *Rhizobium* (b) *Salmonella* (c) *Pseudomonas* **(d) *Thermus aquaticus***

164. Which one of the following bacterium can cause crown gall disease in plants?
(a) *Bacillus* (b) *Clostridium* **(c) *Agrobacterium tumefaciens*** (d) *E.Coli*

165. Actinomycetes are also called _____

(a) Ray Fungi (b) Liverworts (c) Hyphae (d) Pileus

166. Extra chromosomal self-replicating DNA segments called _____ .
(a) CDNA (b) rDNA **(c) Plasmid** (d) RNA

167. Which one of the following is a rod-shaped bacteria?
(a) *Coccus* **(b) *Bacillus*** (c) *Spirillum* (d) *Vibrio*

168. An example of photoautotrophic bacteria is ____ .
(a) *Nitrosomonas* (b) *Nitrobacter* **(c) *Chlorobium*** (d) *Spirillum*

169. An example of chemoautotrophic bacteria is ___ .
(a) *Chlorobium* (b) *Rhizobium* **(c) *Nitrosomonas*** (d) *Escherichia*

170. A bacterial cell is covered by _____ .
(a) glycocalyx (b) flagellin (c) chitin (d) peptidoglycan

171. Disease causing organisms are called as _____ .
(a) organisms **(b) pathogens** (c) recipients (d) decomposers

172. Bacterial photosynthesis differs from higher plants in evolution of _____ .
(a) Oxygen (b) Hydrogen sulphide (c) Hydrogen (d) CO_2

173. Who discovered the Transformation process?
(a) Griffith (b) Ehrenberg (c) Pasteur (d) Hooke

174. Which of the following is called 'true bacteria'?
(a) Archaebacteria **(b) Eubacteria** (c) *Methanobacterium* (d) *Halobacterium*

175. Identify the fastest growing cyanobacteria.
(a) *Halobacterium* (b) *Methanobacterium* **(c) *Spirulina*** (d) *Thermoprotens*

176. Which one of the following organisms completely lacks a cell wall?
(a) Eubacteria (b) Archaebacteria (c) Fungi **(d) Mycoplasma**

177. Who introduced the Gram staining method?
(a) Bergy **(b) Christian Gram** (c) Ehrenberg (d) Lederberg

178. The study of Bacteria is called _____ .
(a) Virology (b) Mycology (c) Physiology **(d) Bacteriology**

179. Who discovered plasmid ?
(a) David (b) Koch **(c) Joshua Lederberg** (d) Griffith

180. Bacteria were first discovered by _____ .
(a) Ehrenberg **(b) Leeuwenhoek** (c) Koch (d) Bergy

181. Who is the Father of Indian Mycology?
(a) P.A. Micheli **(b) Sir Edwin John Butler** (c) Blackley (d) Raper

182. Dermatophytes are fungi which cause infection in the _____ .
(a) Head (b) Foot **(c) Skin** (d) Nail

183. _____ is the branch of science that deals with the study of fungi.
(a) Phycology (b) Oncology **(c) Mycology** (d) Psychology

184. If a mycelium contains multinucleate and aseptate hyphae, it is described as _____ .
(a) Coenocytic (b) Septate (c) Aseptate (d) Multinucleate

185. The fungal cell wall is made up of _____ .
(a) cellulose (b) peptidoglycan (c) pectin **(d) chitin**

186. A completely closed ascocarp is called _____ .
(a) cleistothecium (b) perethecium (c) apothecium (d) pseudothecium

187. _____ is a edible fungus.
(a) Aspergillus (b) Claviceps **(c) Agaricus** (d) Penicillium

188. The term animalcules was coined by _____ when he saw bacteria.
(a) Koch **(b) Leeuwenhoek** (c) Pasteur (d) Iwanosky

NEET RELATED QUESTIONS

189. Which of the following are found in extreme saline conditions? (NEET- 2017)
a. **Archaebacteria** b. Eubacteria c. Cyanobacteria d. Mycobacteria

190. Select the mismatch (NEET – 2017)
a. *Frankia Alnus* **b. Rhodospirillum Mycorrhiza** c. *Anabaena Nitrogen fixer* d. *Rhizobium Alfalfa*

191. Which among the following are the smallest living cells, known without a definite cell wall, pathogenic to plants as well as animals and can survive without oxygen? (NEET – 2017)
a. *Bacillus* b. *Pseudomonas* **c. Mycoplasma** d. *Nostoc*

192. Read the following statements (A to E) and select the option with all correct statements (AIPMT – 2015)
i. Mosses and Lichens are the first organisms to colonise a bare rock.
ii. *Selaginella* is a homosporous pteridophyte. C. Coralloid roots in *Cycas* have VAM.
iii. Main plant body in bryophytes is gametophytic, whereas in pteridophytes it is sporophytic.
iv. In gymnosperms, male and female gametophytes are present within sporangia located on sporophyte.
a. B, C and E A, C and D B, C and D **A, D and E**

193. An example of colonial alga is (NEET –2017)
a. Chlorella **b. Volvox** c. *Ulothrix* d. *Spirogyra*

194. Five kingdom system of classification suggested by R.H. Whittaker is not based on (AIPMT – 2014)
a. **Presence or absence of a well defined nucleus** b. Mode of reproduction
b. Mode of nutrition d. Complexity of body organisation

195. Mycorrhizae are the example of (NEET – 2017)
a. Fungitasis c. Amensalism b. Antibiosis **d. Mutualism**

196. Which of the following shows coiled RNA strand and capsomeres? (AIPMT – 2014)
a. Polio virus **b. Tobacco mosaic virus** c. Measles virus d. Retrovirus

197. Viroids differ from viruses in having : (NEET – 2017)
a. DNA molecules with protein coat b. DNA molecules without protein coat
b. RNA molecules with protein coat **d. RNA molecules without protein coat**

198. Select the mismatch (NEET – 2017)
a. Pinus — Dioecious
b. Cycas — Dioecious
c. *Salvinia* — Heterosporous
d. *Equisetum* — Homosporous

199. Life cycle of *Ectocarpus* and *Fucus* respectively are (NEET – 2017)
a. Haplontic, Diplontic
b. Diplontic, Haplodiplontic
c. Haplodiplontic, Diplontic
d. Haplodiplontic, Halplontic

200. Zygote meiosis is characterisitic of (NEET – 2017)
a. *Marchantia* b. *Fucus* c. *Funaria* **d. Chlamydomonas**

201. Which of the following is correctly matched for the product produced by them? (NEET – 2017)
a. *Acetobacter acetic* : Antibiotics
b. *Methanobacterium* : Lactic acid
c. *Penicillium notatum* : Acetic acid

d. Saccharomyces cerevisiae : Ethanol

202. Which of the following components provides sticky character to the bacterial cell? (NEET – 2017)
a. Cell wall b. Nuclear membrane c. Plasma membrane **d. Glycocalyx**

203. Which of the following statements is wrong for viroids? (NEET – 2016)
a. They lack a protein coat b. They are smaller than viruses
b. They causes infections **d. Their RNA is a high molecular weight**

204. In bryophytes and pteridophytes, transport of male gametes require (NEET – 2016)
a. Wind b. Insects c. Birds **d. Water**

205. How many organisms in the list below are autotrophs? (AIPMT Mains 2012)
Lactobacillus, *Nostoc, Chara, Nitrosomonas, Nitrobacter, Streptomyces, Saccharomyces,Trypanosoma, Porphyra, Wolffia*
a. Four b. Five **c. Six** d. Three

206. Which of the following would appear as the pioneer organisms on bare rocks?
a. **Lichens** b. Liverworts c. Mosses d. Green algae

207. Monoecious plant of *Chara* shows occurrence of (NEET-2013)
a. Stamen and carpel on the same plant b. Upper antheridium and lower oogonium on the same plant
b. **Upper oogonium and lower antheridium on the same plant** d. Antheridiophore and archegoniophore on the same plant

208. Read the following five statement (AE) and answer as asked next to them (AIPMT Prelims – 2012)
a. In *Equisetum*, the female gametophyte is retained on the parent sporophyte
b. In *Ginkgo*, male gametophyte is not independent
c. The sporophyte in *Riccia* is more developed than that in *Polytrichum*
d. Sexual reproduction in *Volvox* is isogamous
e. The spores of slime moulds lack cell walls

209. How many of the above statement are correct? (AIPMT Prelims – 2012)
a. Two b. Three c. Four **d. One**

210. 21 One of the major components of cell wall of most fungi is (NEET – 2016)
a. **Chitin** b. Peptidoglycan c. Cellulose d. Hemicellulose

211. Which one of the following statements is wrong? (NEET – 2016)
a. Cyanobacteria are also called bluegreen algae b. Golden algae are also called desmids
b. **Eubacteria are also called false bacteria** d. Phycomycetes are also called algal fungi

212. Flagellated male gametes are present in all the three of which one of the following sets? (AIPMT –2007)
a. **Riccia, Dryopteris and Cycas** b. *Anthoceros, Funaria* and *Spirogyra*
b. Zygnema, Saprolegnia and *Hydrilla* *c. Fucus, Marsilea* and *Calotropis*

213. Ectophloic siphonostele is found in (AIPMT Prelims – 2005)
a. *Adiantum* and Cucurbitaceae **b. Osmunda and Equisetum**
b. c. *Marsilea* and *Botrychium* d. *Dicksonia* and maiden hair fern

214. Which part of the tobacco plant is infected by *Meloidogyne incognita*? (NEET – 2016)
a. Flower b. Leaf c. Stem **d. Root**

215. Select the correct statement (NEET – 2016)
a. Gymnosperms are both homosporous and heterosporous
b. *Salvinia, Ginkgo* and *Pinus* all are gymnosperms
c. **Sequoia is one of the tallest trees**
d. The leaves of gymnosperms are not well adapted to extremes of climate

216. Seed formation without fertilization in flowering plants involves the process of (NEET – 2016)

a. Sporulation b. Budding c. Somatic hybridization **d. Apomixis**

217. Chrysophytes, Euglenoids, Dinoflagellates and Slime moulds are included in the kingdom (NEET – 2016)
a. Animalia **b, Monera** c. Protista d. Fungi

218. The primitive prokaryotes responsible for the production of biogas from the dung of ruminant animals, include the (NEET – 2016)
a. Halophiles b. Thermoacidophiles **c. Methanogens** (d) Eubacteria

2 Marks

1. **Define Growth.**

❖ Growth is an intrinsic property of all living organisms through which they can **increase cells both in number and mass.**

2. **Growth of living thing is an intrinsic property- Justify.**

➲ Living cells grow by the **addition of new protoplasm** within the cells.
➲ Therefore, growth in living thing is **intrinsic.**

3. **Define reproduction and Mention its types.**

➲ Reproduction is the tendency of a living organism to **replicate its own species.**
➲ There are two types of reproduction namely **asexual and sexual**.

4. **What is metabolism? Mention its types.**

➲ The sum total of all the chemical reactions taking place in a cell of living organism is called metabolism.
➲ It is broadly divided into anabolism and catabolism.

5. **What is consciousness and irritability?**

➲ Animals **sense their surroundings** by sense organs. This is called **consciousness.**
➲ Respond of plants to the stimuli is called **irritability.**

6. **Differentiate plant growth from animal growth.**

Plant growth	Animal growth
Growth is **indefinite.**	Growth is **definite.**
It occurs **throughout life**	It occurs for **some period.**

7. **Define cyclosis.**

➲ The **movement of cytoplasm** inside the cell is called cytoplasmic streaming or cyclosis.

8. **Define viruses?**

➲ Viruses are **sub-microscopic, obligate intracellular parasites**.
➲ They have nucleic acid core surrounded by **protein coat**.

9. **Classify viruses based on nature of nucleic acid with example.**

➲ On the basis of nature of nucleic acid viruses are classified into four categories. They are viruses with
1. **ssDNA** (Parvo viruses),

2. **dsDNA** (Bacteriophages),
3. **ssRNA** (TMV) and
4. **dsRNA** (wound tumour virus).

10. Distinguish between deoxyviruses and riboviruses.

Deoxyviruses	Riboviruses
Viruses having **DNA as a genetic materials** are called deoxyviruses. E.g. **Animal viruses** except HIV	Viruses having **RNA as a genetic materials** are called riboviruses. E.g.: **Plant viruses except** cauliflower mosaic virus (CMV)

11. Write the constituents of virions.

➲ The virion is made up of two constituents, **a protein** coat called **capsid** and a core called **nucleic acid**.

12. What are capsomeres?

➲ The protein coat of viruses is made up of approximately **2130 identical protein subunits** called capsomeres.

13. What do you mean by a 'ghost' in virology?

➲ The **empty protein coat left outside** by the phage after penetrating the host cell is called as ghost.

14. What do you understand by "pinning" of phage?

➲ Once the contact is established between tail fibres of phase and bacterial cell, **tail fibres bend to anchor the pins and base plate** to the cell surface.

➲ This step is called **pinning.**

15. What is prophage?

➲ As soon as the phage injects its linear DNA into the host cell, it becomes **circular and integrates into the bacterial chromosome** by recombination.

➲ The integrated phage DNA is now called **prophage.**

16. When does a prophage enters lytic cycle?

➲ On exposure to UV radiation and chemicals the excision of phage DNA may occur and results in lytic cycle.

17. Define virion.

➲ Virion is an **intact infective virus particle** which is non-replicating outside a host cell.

18. What are viroids?

➲ Viroid is a circular molecule of **ssRNA without a capsid**. RNA is of low molecular weight.

19. What are virusoids? Name any two disease caused by viroids.

➲ Virusoids are the **small circular RNAs** which are similar to viroids but they are always linked with larger molecules of the viral RNA.

➲ **Disease caused by viroids**

(a) **Citrus exocortis**
(b) **Potato spindle tuber disease**

20. What are cyanophages? Who reported it first?

Viruses infecting blue green algae are called **Cyanophages** and are first reported by **Safferman and Morris** in the year 1963.

21. Name any two disease caused by Prions.

a. **Bovine Spongiform Encephalopathy** (BSE) (mad cow disease)
b. **Creutzfeldt- Jakob Disease** (CJD)

22. What are mycophages? Who first reported it?

Viruses infecting fungi are called **mycophages or mycoviruses**.
Mycophages were first reported by **Hollings in 1962**.

23. Expand the following acronyms: (a) SARS and (b) AIDS.

a. **SARS: S**evere **A**cute **R**espiratory **S**yndrome
b. **AIDS: A**cquired **I**mrnuno **D**eficiency **S**yndrome

24. Name the two groups of animals according to Aristotle.

➲ **Enaima** - animals with red blood.
➲ **Anaima** - animals without red blood.

25. Which are the demerits of Linnaeus classification?

⌦ Linnaeus classification faced major setback because **prokaryotes and eukaryotes were grouped together.**
⌦ Similarly **fungi,** heterotrophic organisms were **placed along with the photosynthetic plants.**

26. Name the viruses which are used as potential insecticides?

➲ **Cytoplasmic polyhedrosis Granulo viruses** and **Entomopox virus** were employed as potential insecticides.

27. List out the criteria undertaken for Whittaker's classification.

➲ The criteria adopted for the classification include
❖ **Cell structure,**
❖ **Thallus organization,**
❖ **Mode of nutrition,**
❖ **Reproduction and**
❖ **Phylogenetic relationship.**

28. **List out demerits of five kingdom classification.**

⌦ The kingdom Monera and Protista accommodate **both autotrophic and heterotrophic organisms**, cell wall lacking and cell wall bearing organisms thus making these two groups more heterogeneous.
⌦ **Viruses were not included** in the system.

29. How milk is changed into curd, if a few drops of curd is added to it? What is the reason for its sourness?

❖ The change is brought by *Lactobacillus lac tis,* a bacterium present in the curd.
❖ The sourness is due to the **formation of lactic acid**.

30. What is Porin? How it helps the bacteria?

❖ Porin is an **abundant polypeptide** present in bacterial cell walls. It helps in the diffusion of solutes.

31. List out the cytoplasmic inclusions of bacterial cell.

- **Glycogen, poly-B-hydroxybutyrate granules, sulphur granules** and **gas vesicles.**

32. Define Genophore.

- The bacterial chromosome is a **single circular DNA molecule**, tightly coiled and is not enclosed in a membrane as in Eukaryotes.
- This genetic material is called **nucleoid or genophore.**

33. Write the chemical composition of bacterial cell wall.

- The chemical composition of cell wall is rather complex and is made up of **peptidoglycan** or **mucopeptide** (**N-acetyl glucosamine, N-acetyl muramic acid** and peptide chain of 4 or 5 aminoacids).

34. What are polysomes?

- During protein synthesis, the **ribosomes are held together by mRNA** and form the polysomes.

35. What are Pili?

- Pili or fimbriae are **hair like appendages found on surface** of cell wall of gram-negative bacteria.

36. What are capnophilic bacteria? Give an example.

- Bacteria which **require CO_2 for their growth** are called as capnophilic bacteria. Example: *Campylobacter.*

37. Distinguish between Photolithotrophs and Photoorganotrophs.

Photolithotrophs	Photoorganotrophs
In photolithotrophs, the **hydrogen donor is an organic acid** or **alcohol.**	In Photoorganotrophs, the **hydrogen donor is an inorganic substance.** *E.g., Chlorobium E.g., Rhodospirillum*

38. Name the hydrogen donor of green sulphur bacteria and purple sulphur bacteria.

- Hydrogen donor of green sulphur bacteria is **H_2S.**
- Hydrogen donor of purple Sulphur bacteria is **thiosulphate.**

39. Name the bacterial pigment of green sulphur bacteria and purple sulphur bacteria.

- Green sulphur bacteria - **Bacterioviridin**
- Purple sulphur bacteria - **Bacteriochlorophyll**

40. What are endospores?

- Endospores are **thick walled resting spores developed by bacteria** during unfavourable condition. E.g., ***Clostridium tetani*** produces endospores.

41. Mention the various ways by which genetic recombination occurs.

- Genetic recombination in bacteria occurs by **conjugation, transduction and transformation.**

42. What is transformation? Name the bacteriologist who described it.

a. The process of Transfer of **DNA from one bacterium to another** is called transformation.
b. **Frederick Griffith** demonstrated the transformation process.

43. List out the asexual modes of reproduction of bacteria.

Asexual reproduction in bacteria includes **binary fission, conidia formation and endospore formation.**

44. Who discovered transduction? Define it.

- Zinder and Lederberg (1952) discovered transduction in ***Salmonella typhimurum.***
- Phage mediated DNA transfer is called **transduction.**

45. **Name any two bacterial species and the antibiotic produced by them.**

Bacteria	Antibiotic
❖ *Streptomyces griseus*	Streptomycin
❖ *Bacillus polymyxa*	Polymyxin

46. How bacteria helps in vinegar production?

- ***Acetobacter aceti*** bacteria **oxidises ethanol** obtained from molasses by 'fermentation to form vinegar.

47. What do you mean by retting of fibres?

- The fibres from the fibre yielding plants are **separated by the action of *Clostridium*** is called retting of fibres.

48. Name any two plant disease caused by the bacteria and mention the host.

Host Disease	Pathogen
Rice Bacterial blight	*Xanthomonas oryzae*
Citrus Citrus canker	*Xanthomonas citri*

49. Name any four animal disease caused by bacteria.

- **Anthrax, Brucellosis, Bovine tuberculosis and black leg.**

50. Name any four human disease caused by bacteria.

- **Cholera, Typhoid, Tuberculosis and Leprosy.**

51. What are Archaebacteria?

- Archaebacteria are **primitive prokaryotes and are adapted to live in extreme** environment like hot springs, high salinity and low pH. E.g., *Thermoplasma.*

52. How stromatolites are formed?

- Stromatolites are deposits formed when colonies of **cyanobacteria bind with calcium carbonate**.

53. What is the reason for the colour of Red Sea?

- A cyanobacteria called ***Trichodesmium erythraeum*** imparts red colour to sea.

54. **Define Cyanobacteria.**

- Cyanobacteria are popularly called as **'Blue green algae' or 'Cyanophyceae'**.
- They are **photosynthetic, prokaryotic** organisms.
- Cyanobacteria are primitive forms and are in different habitats.

55. Blue green algae can also be called as Myxophyceae. How?

The presence of **mucilage around the thallus** is characteristic feature of cyanobacteria group. Therefore, this group is also called **Myxophyceae.**

56. Name few plant disease caused by mycoplasma.

- **Little leaf of brinjal,**
- **witches broom of legumes,**
- **phyllody of cloves** and
- **sandal spi**

57. What is the reason behind the earthy odour after raining?

Streptomyces is a mycelial forming **Actinobacteria** which lives in soil, they impart "eodour" to soil after rain which is due to the presence of geosmines (volatile or compound).

58. Define Fungi.

Fungi are **ubiquitous, eukaryotic, achlorophyllous heterotrophic** organisms. They exist in **unicellular or multicellular forms.**

59. Define mycology. Who is the founder of mycology?

- **Study of fungi** is called mycology. **P.A. Micheli** is considered as the founder of mycology.

60. With example define coenocytic mycelium.

In lower fungi the hypha is **aseptate, multinucleate** and is known as **coenocytic mycelium** (Example: *Albugo).*

61. What is plectenchyma? Mention its types.

- The **mycelium is organised** into loosely or compactly interwoven fungal tissues called **plectenchyma**.
- It is further divided into two types: **prosenchyma and pseudoparenchyma.**

62. Distinguish between Anamorph and Telomorph.

The **asexual phase** of fungi is called anamorph.
The **sexual phase** of fungi is called telomorph.

63. What is holomorph?

- **Fungi showing both sexual and asexual** phases are called **holomorph.**

64. What is planogametic copulation? Mention its types.

- Fusion of motile gamete is called **planogametic copulation**. Types - **Isogamy, Anisogamy and Oogamy.**

65. List out the asexual spores produced by fungus.

- **Zoospores, conidia, oidia and chlamydospores.**

66. What are coprophilous fungi? Give an example.

- Fungi **growing on dung** are called **coprophilous fungi**. Example: *Pilobolus.*

67. Ascomycetes are called sac fungi. Give reason.

- In ascomycetes the ascospores are found **inside a bag like structure** called ascus.
- Due to the presence of ascus, this group is popularly called **"Sac fungi"**

68. Name the four types of ascocarps produced by ascomycetes.

- **Cleistothecium, Perithecium, Apothecium and Pseudothecium.**

69. Basidiomycetes are called club fungi. Why is it so ?

- In basidiomycetes the **basidium is club shaped with four basidiospores**, thus this group of fungi is popularly called **"Club fungi".** The fruit body formed is called Basidiocarp.

70. Name the special structures in deuteromycetes that produces conidia.

- **Pycnidium, acervulus, sporodochium and synnemata.**

71. Deuteromycetes are imperfect fungi - Justify.

- The fungi belonging to deuteromycetes **lack sexual reproduction** and are called imperfect fungi.

72. List out the antibiotics produced by fungi.

Penicillin, cephalosporins and griseofulvin.

73. Name some toxins produced by Fungus.

Alfatoxin, Patulin and Ochratoxin-A.

74. Name two fungal species employed as Biopesticides.

Beauveria bassiana and *Metarhizium anisopliae.*

75. Name few fungal diseases in plants.

Blast of paddy, rust of wheat, red rot of sugarcane and **white rust of crucifers.**

76. Name few fungal diseases in Humans .

Human Diseases	Causative Fungi
Athlete's foot	*Epidermophyton floccosum*
Candidiasis	*Candida albicans*
Coccidioidomycosis	*Coccidioides immitis*
Aspergillosis	*Aspergillus fumigatus*

77. What is mycorrhiza? Add its types

- The symbiotic association between **fungal mycelium and roots of plants** is mycorrhiza.

Types : Ectomycorrhiza, Endomycorrhiza and Ectendomycorrhiza

78. Define lichen. What is its significance.

- Lichen is a symbiotic association **between algae and fungi.**
- In lichens, algae provide nutrition for fungal partner in tum fungi provide protect also help to fix the thallus to the substratum through rhizmae.

79. What is a phycobiont and mycobiont?

- **Fungal partner** of lichen is called as mycobiont.
- **Algal partner** of lichen is (phycobiont.

80. Classify lichens based on morphology.

- **Leprose** -Absence of distinct fungal layer
- **Crustose** - Crust-like
- **Foliose**- Leaf-like
- **Fruticose**- Branched pendulous shrub-like

81. **Define ascolichen and basidiolichen.**

- If the fungal partner of **lichen belongs to ascomycetes**, it is called as ascolichen. as basidiomycetes it is called **basidiolichen.**

82. Lichens are pollution indicators. How?

- Lichens are sensitive to air pollutants especially to **sulphur-di-oxide**.
- Therefore,considered as pollution indicators.

83. **Differentiate Homoiomerous and Heteromerous lichens.**

- Lichens is an Symbiotic association between algae and fungi.
- **Homoiomerous Lichens** - Algal cells are evenly distributed in the thallus.
- **Heteromerous Lichens** - A distinct layer of algae and fungi present in the thallus.

84. **Write the distinguishing features of Monera.**

- They are **prokaryotic organisms**.
- Cell wall is present and made of **peptidoglycan and mucopeptides.**
- They are unicellular. Eg : **Cyanobacteria, Mycoplasma.**

85. **What is Homeostasis?**

- Property of self-regulation and **tendency to maintain a steady state** within an external environment which is liable to change is called Homeostasis. It is essential for the living organisms.

86. **What is a Prophage?**

- In the lysogenic cycle of a phage, the **integrated phage DNA with bacterial DNA** is called prophage.

87. **Mention any two features of Bacteria.**

- They are **prokaryotes.**
- The genetic material is called **nucleoid and lacks nuclear membrane**.
- They reproduce by **fission. (Binary or Multiple)**

88. **What are capnophilic bacteria?**

- Bacteria which **require CO_2** for their growth are called **Capnophilic bacteria** . Eg : ***Campylobacter.***

89. **What is the role of bacteria in production of Tea?**

- The special flavor and aroma of the tea are due to fermentation of Tea leaves by bacteria.

Eg: *Bacillus megatherium*. This is called curing of Tea and Tobacco.

90. **What is ergot?**
- It's a fungal group refer to **genus Claciceps**
- It is a Alkaloid produced by ***Claviceps purpurea*** (fungus), called **ergotamine.**
- Its is used as **vasoconstrictor**.

91. **What is the significance of yeast?**
- Yeast is used for the fermentation of **sugars to yield alcohol.**
- Bakeries use yeast for the production of **bread, buns, rolls** etc.

92. **What are toads tools?**
- Fungi like *Amanita verna* are **highly poisonous** due to the production of Toxins. They are commonly referred to as **Toad stools.**

93. **What is heterothallism?**
- In sexual reproduction of fungi, the **two sexual hyphae are morphologically similar but dissimilar physiologically.**
- This phenomenon is called heterothallism. Eg : ***Rhizopus*.**

94. **Bt crops - What are they?**
- Bt toxin found in ***Bacillus thuringiensis*** finds application in raising **insect resistant crops** (Bt Crops).

95. **Name a biodegradable plastic. How it is produced ?**
- **PHB** (**Poly-β hydroxyl butyrate**) is a microbial plastic synthesize by *Ralstonia*.

96. **Name a microbe used in PCR Technology.**
- ***Thermus aquaticus*** is a thermophilic gram negative bacteria which produces **Taq Polymerase** a key enzyme for **Polymerase Chain Reaction** (PCR).

97. **Cyanobacteria helped in raising level of free oxygen in Atmosphere. How it was proved ?**
- *Their **abundance in fossil records** proves that they have helped to raise level of free oxygen in the atmosphere.*

98. **What is the significance of phytophthora infestans?**
- *It is a fungus which causes **late blight of Potato** and affected the potato crop in Ireland.*
- *It caused a million deaths forcing people to migrate, since potato is the staple food in Ireland.*

99. **Define Metabolism. Mention its types.**
- The sum total of all the chemical reactions taking place in a cell of a living organism is called **metabolism.**
- It is broadly divided into **anabolism** and **catabolism.**

100. **What does Mycophages mean?**
- The viruses attacking fungi are called **Mycoviruses** or **Mycophages.**

101. **Mention the function of Glycocalyx.**
- It is a thick, **gelatinous layer bound tightly** to the cell wall of bacteria.
- It protects the cell from **dehydration and antibodies.**

102. **What are polysomes?**
- Ribosomes held together, by mRNA form **polysomes or polyribosomes** and are the sites of protein synthesis in a cell.

103. **What are Hormogones?**
- A portion of filament of blue green algae that becomes **detatched** and reproduces by cell division. Eg : ***Nostoc.***

104. **Why do we call Actinomycetes as 'Ray fungi'?**
- Actinomycetes are also called 'Ray Fungi' **due to their mycelia** like growth. Eg : ***Streptomyces.***

105. **How do Viroids differ from Viruses?**

S.No.	Viroid	Viruses
1.	Viroid is a **circular molecule of ssRNA.**	Virus has a **nucleic acid - RNA or DNA.**
2.	Without a **capsid.**	Covered by **capsid.**
3.	RNA has **low molecular weight.**	RNA or DNA may be **single or double stranded.**

106. **Explain the statement of non-living things also grow.**
- Non-living things like mountains, boulders, sand dunes also grow by **accumulating the material** on their external surface.
- But, this growth is considered as external **growth in comparison to the growth** of living things which is internal.

107. **What is the need for classification?**
- **Need for classification:**
- **To relate things** based on common characteristic features.
- **To define organisms** based on the salient features.
- Helps in knowing the **relationship amongst different groups** of organisms.

108. **What are Magnetosomes?**
- Intracellular chains of 40 - 50 magnetite (Fe_3O_4)particles found in bacterium - ***Aquaspirillum magnetotacticum*** which helps the bacterium to locate nutrient rich sediments.

109. **What are endospores?**
- During unfavourable condition bacteria produce thick walled resting spores called **endospores.** Eg: ***Clostridium tetani.***

110. **What is Pruteen?**

"Pruteen" is a single cell protein derived from ***Methylophilus*** and ***Methylotropus***

111. **What is hyphae?**

The fungal body is an assemblage of **long extremely fine,** almost transparent threads called **hyphae**.

112. **What is mycelium?**

Numerous hyphae are **twined around** one another to form **mycellium** - vegetative body of a fungus.

113. **What is a lysogenic phage?**

- In the lysogenic cycle of phage, the **phage DNA gets integrated into the DNA** of the host cell and gets multiplied along with nucleic acid of the host.
- **No independent viral particle** is formed.

114. **Why are viruses considered to be a biologist's puzzle?**

- They exhibit both **living and non living characteristics**.
- Hence they are considered to be a **biologists puzzle**.
- They multiply within a living host and act as **non living particles** outside host cell.

115. **What are Gram-Positive bacteria?**

- The bacteria which retain the violet colour in Gram's staining procedure are called as Gram +ve.
- Eg: ***Pneumococcus, Streptococcus.***

116. **What is red tide ?**

- Red tide is caused by **toxic bloom of Dinoflagellates** like *Gymnodinium* species.
- A major red tide incident in west coast of Florida in the year (1982) killed thousands of fishes.

117. **Why is koch considered to be the founder of modern bacteriology?**

- He identified the causal organism for **Anthrax, Cholera and Tuberculosis.**
- He experimentally proved the **concept of infection.**
- He received a Nobel prize in Medicine (1905).

118. **What are Probiotics?**

- Probiotics are live microorganisms that when **administered in adequate amounts** confer health benefit on the host.
- Eg: **Yoghurt** is a probiotic food. It contains ***Lactobacillus*** species.
- It maintains **gut flora** in humans and maintains good health.

119. **Which bacteria is called a super bug?**

- A bacterium named ***Pseudomonas putida*** is a superbug genetically engineered which breakdown hydrocarbons.

120. **How does *Agrobacterium* help in genetic Engineering?**

- ***Agrobacterium tumefaciens*** causes crown gall disease in plants but its inherent tumour inducing principle helps to carry the desired gene into the plant through Genetic engineering.

121. **New phages are not formed in lysogenic cycle. Explain.**

- The integrated phage DNA (Prophage) activity is supressed by repressor proteins which checks the synthesis of new phage.

122. **What is Mycorrhiza? Mention the types.**

- The Symbiotic association between fungal mycelium and roots of plants is called as mycorrhizae. Types.
- **Ectomycorrhizae**
- **Endomycorrhizae**
- **Ectendomycorrhizae**

123. **Gamete formation and fusion are absent in bacteria. How do then bacteria undergo sexual reproduction? Justify the above statement.**

- It occurs by conjugation. It involves transfer of genetic material from one bacterium to another through cell to cell contact.

124. **What are Gram-Negative bacteria?**

- The bacteria which become decolourised and appear in red colour in Gram's staining procedure are called as Gram –ve. Eg: ***E.coli, Salmonella.***

125. **Why is Rhizopus called as 'Bread mould'?**

- Rhizopus is a saprophytic fungus and grows on substrates like bread, jelly, leather, decaying vegetables and fruits.
- It is commonly called 'Bread mould'. Since it easily grows on stale bread and is of common occurence on bread.

3 MARKS

1. **Mention the potential applications of fungi in agriculture.**

- Mycorrhiza forming fungi like **Rhizoctonia** helps in absorption of water and minerals.
- Fungi like ***Beauveria bassiana*** are used as biopesticides to eradicate crop pests.
- Gibberellin is a plant growth promoter produced by a fungus ***Gibberella fujikuroi***.

126. **What is transduction? Mention the types.**

- **Phage mediated DNA transfer** is called transduction. It is of two types.

Generalised Transduction.

- The ability of a bacteriophage to carry genetic material of any region of bacterial DNA is called **Generalised transduction**.

Specialized Transduction or Restricted Transduction.

- The ability of the bacteriophage to carry only a specific region of the bacterial DNA is called **specialized** or **restricted transduction**.

127. **Distinguish Prokaryotic and Eukaryotic organisms.**

S.No.	Prokaryotic	Eukaryotic
1.	**Unicellular organisms.**	Unicellular or multicellular organisms.
2.	**Lack membrane bound nucleus.**	**Definite mucleus** is present bound by nuclear membrane.
3.	Organelles like **mitochondria, endoplasmic reticulum are absent.**	Organelles like **mitochondria, endoplasmic reticulum are present.**
4.	Eg : ***Amoeba.***	Eg : ***Oedogonium.***

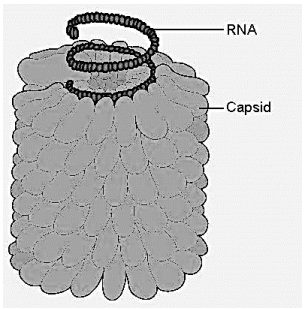
128. **What are the three main symmetry of viruses?**
- Generally viruses are of three types based on shape and symmetry.
- Cuboid symmetry - Eg : **Adenovirus, Herpes virus.**
- Helical symmetry - Eg : **Influenza virus, TMV.**
- Complex or Atypical symmetry - Eg : **Bacteriophage, Vaccinia virus.**

129. **Write down the living characteristic features of virus.**
- Presence of nucleic acid and protein.
- Capable of **mutation.**
- **Ability to multiply** within living cells.
- **Ability to infect** and cause diseases in living beings.
- **Show irritability.**
- **Host –specific.**

130. **Write down the non- living characteristic features of virus.**
- Can be **crystallized.**
- Absence of metabolism.
- **Inactive outside** the host.
- Do not show functional autonomy.
- Energy producing enzyme system absent.

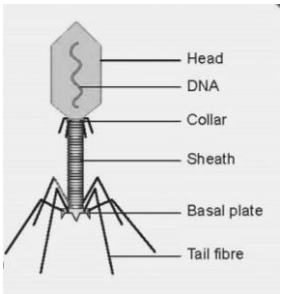
131. **What are Prions? Who discovered it?**
- Prions were discovered by **Stanley B. Prusiner** in the year **1982** and are proteinaceous infectious particles.
- They are the causative agents for about a dozen fatal degenerative disorders of the central nervous system of humans and other animals.
- For Eg : **Creutzfeldt – Jacob Disease (CJD), Bovine spongiform Encephalopathy (BSE)** – commonly known as **mad cow disease.**

132. **What are the symptoms of Tobacco Mosaic disease?**
- **Discoloration of leaf colour along the veins.**
- Typical yellow and green mottling which is the mosaic symptom.
- Downward curling of **young apical leaves.**
- **Stunted growth.**

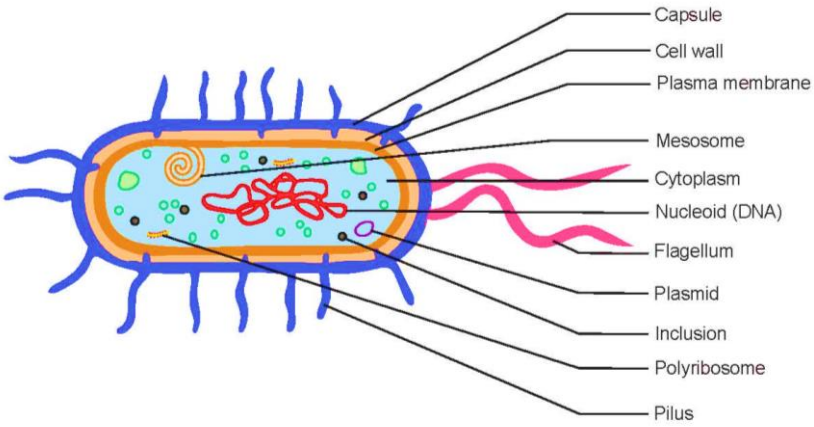


133. **Draw the structure of TMV and label the parts.**

134. **Draw a T_4 bacteriophage and label the parts.**



135. **Draw a neat diagram of Ultra structure of a bacterial cell.**



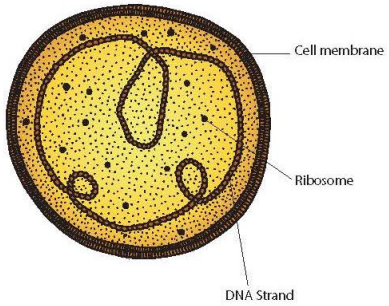


Figure 1.18: Structure of *Mycoplasma*

136. **Draw a labelled diagram of *Mycoplasma*.**

137. **List out the bacteria used in Dairy industry.**

1.	***Streptococcus lactis*** and ***Lactobacillus bulgaricus.***	Making curd (Convert milk sugar lactose into lactic acid).
2.	***Lactobacillus lactis.***	Used in making cheese.
3.	***Streptococcus lactis.***	Used in curd and making butter.

138. **What is Fimbriae or Pili?**

- Pili or Fimbriae are hair like appendages found on surface of cell wall of **gram-negative bacteria** Eg: ***Enterobacterium.***
- The pili are **0.2 to 20 µm** long with a diameter of about **250Aº.**
- In addition to normal pili there are **special type of pili** which help in conjugation called **sex pili** are also found.

139. **What are actinomycetes ? Give example.**

- Actinomycetes or 'Ray fungi' are anaerobic or facultative anaerobic microorganisms.
- They show mycelia like growth.
- Eg : **Streptomyces.**

140. **A complete virus particle is only capable of infection. Do you agree?**

- Yes a complete **virus particle refers to virus** with capsid and nucleic acid.
- Viruses cannot infect a host. If **nucleic acid is not present**.

141. **List out the Animal diseases caused by Bacteria.**

S. No	Name of the Animal	Name of the diseases	Name of the pathogen
1.	Sheep	Anthrax	***Bacillus anthracis***
2.	Cattle	Brucellosis	***Brucella abortus***
3.	Cattle	Bovine tuberculosis	***Mycobacterium bovis***
4.	Cattle	Black leg	***Clostridium chanvei***

142. **Mention the economic importance of lichens.**

- Lichens secrete organic acids like **Oxalic acids** which corrodes the rock surface and helps in weathering of rocks, acting as pioneers in **Xerosere.**
- Lichens are sensitive to air pollutants and are considered as **pollution indicators**.
- ***Cladonia rangiferina*** (Reindeer moss) is used as food for animals living in Tundra regions.
- Usnic acid produced from lichens show antibiotic properties.

143. **Cyanobacteria plays a major role in our ecology. Discuss.**

- Cyanobacteria, also known as '**blue green algae'** help in carbon fixation in a major way on the **ocean surface.**
- They are helpful in **nitrogen fixation** in paddy fields leading to a **better harvest**.
- About 80% of photosynthesis on ocean surface is done by cyanobacteria. So, it can be said that they play a **major role in our ecology**.

144. **Write down the characteristics features of Archaebacteria.**

- They are most **primitive prokaryotes.**
- They are found in **extreme environmental conditions**. Eg: Hot springs.
- Unique feature is presence of lipids like **glycerol and isopropyl** ethers in their cell membrane.
- Hence the membrane shows resistance against cell wall antibiotics. Eg: Methanobacterium.

145. **What is the importance of Mycorrhizae?**

Importance of Mycorrhizae :

- Mycorrhizae helps to derive nutrition in **Monotropa**, a saprophytic angiosperm.
- Improves the availability of **minerals and water to the plants**.
- Provides **drought resistance** to the plants.
- Protects **roots of higher plants** from the attack of plant pathogens.

146. **Lichens are the pioneer organisms. Justify.**

- Lichens are the pioneer organisms in the **new terrains** which colonise bare rocks, mountains and cliffs.
- They corrode the **rocks and accumulate a certain amount of minerals** and organic matter.
- The plants like mosses and grasses appear **later in sequence**, utilizing the first soil formed by lichens.
- Lichens thus, can convert a barren area into one that can support vegetation.

147. **Discuss in detail about the Bacterial Chromosome.**

- The Bacterial Chromosome is a single circular DNA molecule, tightly coiled and is not enclosed in a membrane as in Eukaryotes.
- This genetic material is called **Nucleoid or Genophore.**
- The DNA is not bound to **histone proteins**.

148. **Name some plant diseases caused by Fungi.**

Plant diseases caused by fungi:

S. No.	Name of the disease	Causal organism
1.	Red rot of sugarcane	*Colletotrichum falcatum*

2.	Anthracnose of Beans	*Colletotrichum lindemuthianum*
3.	White rust of crucifers	*Albugo candida*

149. **List out some Human diseases caused by Fungi.**

Human diseases caused by fungi:

S.No.	Human diseases	Causal organisam
1.	Athlete's foot	*Epidermophytonfloccosum*
2.	Candidiasis	*Candida albicans*
3.	Coccidioidomycosis	*Coccidioides immitis*
4.	Aspergillosis	*Aspergillus fumigatus*

150. **Tabulate the difference between anabolism and catabolism.**

Metabolism includes Anabolism and Catabolism.

S.No.	Anabolism	Catabolism
1.	**Building up process.**	**Breaking down process.**
2.	Smaller molecules combine together **to form larger molecule.**	Larger molecule break **into smaller units.**
3.	**Energy is consumed.**	**Energy is released.**
4.	Chemical energy is formed and stored.	The stored chemical energy is released and used.
5.	Eg: **Synthesis of proteins from amino acids.**	Eg: **Breaking down of glucose to $CO_2$and water**

151. **List some viral diseases which occur in plants.**

Plant Diseases :

i. Tobacco Mosaic Disease.
ii. Cauliflower Mosaic Disease.
iii. Sugarcane Mosaic Disease.
iv. Potato leaf roll.
v. Bunchy top of banana.
vi. Leaf curl of papaya.
vii. Vein clearing of Lady's finger.
viii. Rice tungro disease.
ix. Cucumber Mosaic Disease.
x. Tomato spotted wilt Disease.

152. **List some viral diseases which occur in Humans.**

i. **Human Diseases :**
ii. Common cold.
iii. Hepatitis B.
iv. Cancer.
v. SARS(Severe Acute Respiratory Syndrome).
vi. AIDS(Acquied Immuno Deficiency Syndrome).
vii. Rabies.

viii. Mumps.
ix. Polio.
x. Chikungunya.
xi. Small Pox.
xii. Chicken pox.
xiii. Measles.

153. **Why do farmers plant leguminous crops in crop rotations/mixed cropping?**

- ❖ The bacteria Rhizobium forms root nodules in the leguminous crops only and lives in symbiotic association with the plant.
- ❖ They help to convert atmospheric nitrogen to nitrate salts in the soil thereby adding to soil fertility.
- ❖ Hence growing leguminous crops in crop rotations / mixed cropping helps to maintain fertility of the soil.

154. **Can you imagine a world without bacteria and Fungi. How it will be?**

- ➢ No.
- ➢ The whole place would be littered with dead material of living organisms since bacteria and fungi are nature's scavengers and decompose the dead waste.
- ➢ Nutrients taken from soil by plants will not be returned to the soil without bacteria and fungi.
- ➢ There will be soil odour.
- ➢ Disease causing pathogens will increase in number and affect all living organisms.

155. **Stem cuttings in higher plants resemble the fragmentation in lower plants. Do you agree?**

- ➢ **Stem cuttings** : Cuttings of stems of higher plants are used for vegetative propagation. Eg : **Sugarcane.**
  Fragmentation : The plants body of lower plants like algae break into fragments and each fragment can grow independently into new plants.
- ➢ Both serve for vegetative propagation.
- ➢ But stem cutting is a artificial method.
- ➢ Fragmention is a natural method.

156. **A Farmer is cultivating different vegetable crops in a field. One day he could see white rust symptoms of *Albugo* destroying the Greens but all other crops are found healthy. He reports this observation to you. Can you find out the reason why this pathogen has not attacked other vegetable crops?**

- ➢ Each pathogen is specific to a host and cannot attack all organisms.
- ➢ ***Albugo*** causes white rust in greens which is the specific host plant for it. Hence other vegetable crops are found healthy.

157. **A farmer after testing the soil reports to you that his land is poor in nitrogen content. What suggestive measures you provide to him?**

- ➢ He can grow leguminous plants along with other crops by mixed cropping or crop rotation.
- ➢ The symbiotic bacteria Rhizobium forms root nodules in legume plants and fixes atmospheric nitrogen as nitrate salts in the soil which increases fertility of the soil.
- ➢ Biofertilizers Eg : **Nostoc, Anabaena** can also be used to increase soil fertility.

158. **Is bacterial photosynthesis similar to photosynthesis in higher plants? Reason out.**

S.No.	Bacteria	Higher Plants
1.	H_2S is hydrogen donor.	H_2O is hydrogen donor.
2.	Oxygen is not evolved.	Oxygen is evolved.
3.	***Chlorobium Chlorophyll*** is an example of pigment.	***Chlorophylls*** are the pigments involved in photosynthesis.

159. **Why reproduction is necessary? Is it essential for survival? If a living organism does not reproduce, to which category will it belong, living or non-living?**

- Reproduction is required for the perpetuation of a population.
- It is not necessary for the survival of living organisms.
- Many organisms. Eg: **Mules, Sterile worker bees,**infertile human couples are not able to reproduce, while they have all other defining properties of life, so they can be called as Living.

160. **Why reproduction cannot be the defining characteristic of living organisms?**

- There are many organisms, which never reproduce in their life, although all other characteristics of living things are present in them.
- Eg: **Sterile worker bees, mules, infertile human couples etc.,**
- Hence reproduction cannot be an all-inclusive defining property of living things.

161. **How is sexual reproduction different from asexual reproduction?**

- Sexual reproduction involves the formation and fusion of two kinds of gametes to produce an offspring.
- In asexual reproduction, new individuals can arise from the various parts of body without the fusion of gametes and by production of structures like spores, buds etc.

162. **All the organisms are not yet identified on the earth. Prove the statement.**

- There are diverse habitats on earth hosting millions of living organisms.
- Due to limited number of taxonomists, absence of thorough survey of different areas and occurrence of several inaccessible regions like **Hot springs, Underwater reefs,** etc., it is difficult to identify all the organisms.

163. ***Neurospora*, an ascomycetes fungus has been used as a biological tool to understand the mechanism of plant genetics much in the same way as *Drosophila* has been used to study animal genetics. What makes *Neurospora* as a genetic tool? Justify your answer.**

- *Neurospora* is used as a biological tool to understand the mechanism of plant genetics by the scientists. It because of the following reasons.
- It is haploid and so recessive traits can be studied easily.
- A lot of information is available about its genome.
- As a result of sexual reproduction, it produces eight ascospores which show a specific arrangement. This helps to study recombination.

164. **Lichens play important play role in biological succession and soil formation. Give the reason.**

- Lichens growing on rocks secrete organic acids like oxalic acid. The acids enter the rock and produce a number of honey comb-like small crevices.

- Moss spores are able to grow over such crevices and start the process of succession and soil formation.

5 MARKS

(Refer class notes guide)

1. Briefly discuss on five kingdom classification. Add a note on merits and demerits.
2. Give a general account on lichens.
3. Give a brief account on the attributes of living world.
4. Describe the structure of Tobacco Mosaic Virus.
5. Explain Lytic cycle of a phage.
6. Explain Lysogenic cycle of a phage.
7. Tabulate the comparison of kingdoms in the Five Kingdom classification based on the criteria used.
8. Write down the general characteristic features of Bacteria.
9. Explain the ultrastructure of bacterial cell.
10. Write down the salient features of cyanophyceae.
11. Explain the different methods of asexual reproduction in fungi.
12. Write down the salient features of Ascomycetes.
13. What are Mycorrhizae? Explain the types.
14. Why are viruses known as the intermediate between living and non-living entities?
15. Differentiate Gram positive and Gram negative bacteria.
16. Explain conjugation in bacteria.
17. List the differences between Bacteria and Cyanobacteria.
18. Describe the structure of T_4 phage.
19. Explain transformation in bacteria as experimented by Griffith.
20. Write a note on Basidiomycetes.
21. Write a note on economic importance of bacteria.
22. Describe the Respiration life processes in Bacteria.
23. Discuss in detail about mode of nutrition in bacteria.
24. List out some Human & plant diseases caused by Bacteria.
25. What is Cyanobacteria? Explain its different Habitats.
26. Explain the characteristic features of Mycoplasma or Mollicutes.
27. Explain the general characteristic features of Actinomycetes.
28. Write about Sexual Reproduction in Fungi.
29. Give the salient features of the class Zygomycetes.
30. Give the salient features of the class Deuteromycetes.
31. Discuss the economic importance of Fungi.

1. Which of the plant group has gametophyte as a dominant phase?
   a. Pteridophytes b. Bryophytes c. Gymnosperm d. Angiosperm
2. Which of following represent gametophytic generation in pteridophytes?
   a. Prothallus b. Thallus c. Cone d. Rhizophore
3. The haploid number of chromosome for an Angiosperm is 14 , the number of chromosome in its endosperm would be
   a. 7 b. 14 c. 42 d. 28
4. Endosperm in Gymnosperm is formed
   a. At the time of fertilization b. Before fertilization
   c. After fertilization d. Along with the development of embryo

ADDITIONAL QUESTIONS SOLVED

5. Gametophytic phase is .....
   (a) triploid (b) tetraploid **(c) haploid** (d) diploid
6. Haplodiplontic life cycle is seen in .....
   (a) algae (b) gymnosperm **(c) bryophytes** (d) angiosperm
7. Which algae leads an endozoic life in Hydra?
   (a) *Chlorella* (b) *Gracilaria* *(c) Ulothrix* (d) *Chlorella*
8. Study of algae is called .....
   (a) biology (b) mycology (c) bryology **(d) phycology**
9. Siliceous walls are present in .....
   (a) *Chqra* (b) *Chlamydomonas* (c) *Dunaliella* **(d) *Diatoms***
10. In *Chara,* thallus is encrusted with .....
    (a) calcium carbonate (b) hydrogen sulphate (c) silica (d) ammonium carbonate
11. Pyrenoids are present in .....
    (a) mitochondrion **(b) chloroplast** (c) ribosomes (d) lysosomes
12. Type of vegetative reproduction seen in *ulothrix* is .....
    (a) bulbils (b) fission **(c) fragmentation** (d) tubers
13. ..... are thin walled non-motile spores.
    (a) Zoospores (b) Akinetes **(c) Aplanospores** (d) Gemmae
14. Fusion of either morphologically or physiologically dissimilar gametes is called as
    (a) isogamy **(b) anisogamy** (c) syngamy (d) oogamy
15. According to Fritsch, the algae are classified into ..... classes.
    (a) 10 (b) 12 **(c) 11** (d) 10
16. Photosynthetic part of the phaeophyceae thallus is called as .....
    (a) holdfast (b) stipes (c) lamina **(d) fronds**
17. A characteristic pigment ofphaeophyceae is .....
    (a) xanthophyle (b) carotenoid **(c) fucoxanthin** (d) chlorophyll
18. ..... is used as single ceU protein.
    (a) *Chlorella* (b) Kelps (c) *Chlamydomonas* (d*Spirogyra*
19. Gelidium belongs to ..... members.
    (a) Rhodophyceae (b) Phaeophyceae (c) Cyanophyceae (d) Dinophyceae
20. Carrageenan is obtained from .....
    (a) *Chlorella* (b) *Chara* **(c) *Chondrus*** (d) *Chlamydomonas*
21. ..... are the amphibians of the plant kingdom.
    (a) Pteridophytes (b) Algae (c) Gymnosperms **(d) Bryophytes**
22. *Marchantia* vegetatively propagates by .....
    (a) tubers **(b) gemmae** (c) buds (d) brood bodies

23. 'Peat is obtained from .....
(a) *Anthoceros* (b) *Dendroceros* **(c) *Sphagnum*** (d) *Funaria*

24. .....is a bryophyte used to cure pulmonary tuberculosis.
(a) *Marchantia polymorpha* (b) *Polytrichum* (c) *Sphagnum* (d) *Bryum*

25. Type of stele seen in *Marsilea* is .....
(a) Protostele **(b) Siphonostele** (c) *Adiantum* (d) *Selaginella*

26. Which of the following pteridophyte is used as a biofertiliser?
(a) *Marsilea* (b) *Pteridium* (c) *Pteris* **(d) *Azolla***

27. Which of the following is naked seed producing plant.....
(a) Angiosperm **(b) Gymnosperm** (c) Pteridophytes (d) Bryophytes

28. Amber is obtained from .....
(a) Angiosperm **(b) Gymnosperm** (c) Pteridophytes (d) Bryophytes

29. Coralloid roots of *cycas* have symbiotic association with .....
(a) Blue green algae (b) Mycorrhiza (c) Euglena (d) Rhizobium

30. Pinus roots are in symbiotic relationship with .....
(a) Blue green algae **(b) *Mycorrhiza*** (c) *Euglena* (d) *Rhizobium*

31. Which is not a class of Gymnosperm?
(a) Lycopodia (b) Cycadopsida (c) Coniferopstda (d) Gnetopsida

32. The endosperm of gymnosperm is .....
(a) haploid (b) triploid (c) diploid (d) polyploidy

33. Shiwalik fossil park is located at .....
(a) Madhya Pradesh **(b) Himachal Pradesh** (c) Rajmahal hills (d) Jharkhand

34. When does the angiosperm appeared on Earth?
(a) Devonian (b) Cambrian **(c) Early cretaceous** (d) Precambrian

35. Which is also called as vascular cryptogam?
(a) Gymnosperms **(b) Pteridophytes** (c) Bryophytes (d) Algae

36. Which is not a cryptogam?
(a) Algae (b) Bryophytes (c) Pteridophyta **(d) Angiospermae**

37. ..... is a halophytic alga.
(a) *Chlamydomonas nivalis* (c) *Coleochaete* **(b) *Dunaliella salina*** (d) *Volvox*

38. Who is called as the Father of Indian Phycology?
(a) M.O. Parthasarathy (b) Y. Bharadwaja (c) V.S. Sundaralingam (d) V. Desikachary

39. Wedge shaped modified branches developed by Sphacelaria are called as .....
(a) Buds (b) Akinetes (c) Tubers **(d) Bulbils**

40. Pteridophytes were abundant in the ..... period.
(a) Cambrian (b) Precambrian **(c) Devonian** (d) Cretaceous

41. Heterospory is originated in .....
(a) Gymnosperms **(b) Pteridophytes** (c) Bryophytes (d) Algae

42. Sago is obtained from .....
(a) *Cycas revoluta* (b) *Pinus roxburghii* (c) *Pinus insularis* (d) *Cedrus deodara*

43. _____is not seen in Pinus.
(a) Foliage leaf (b) Polyembryony **(c) Prothallus** (d) Epigeal germination

44. Phycology is the study of __
(a) virus **(b) algae** (c) plants (d) bacteria

45. The members of chlorophyceae are commonly called _____
(a) **Green algae** (b) Brown algae (c) Red plants (d) All the above

46. Most of the chloroplasts have one or more storage bodies called_____ in algae.
(a) gluconoids (b) colloids **(c) pyrenoids** (d) phycocolloids

47. Which one of the following is belongs to the members of phaeophyceae? (or) The members of phaeophyceae are commonly called ____
(a) red algae **(b) brown algae** (c) green algae (d) blue algae

48. Fucus and Laminaria are rich in_____
(a) Calcium (b) Vitamin (c) Nitrogen **(d) Iodine**

49. Which one of the following is belongs to the members of Rhodophyceae? (or) The members of Rhodophyceae are commonly called __
(a) Brown algae (b) Green algae **(c) Red algae** (d) Blue algae

50. The father of algae is ____
(a) **Fritsch** (b) Whittaker c) Joh Ray (d) Hippocrates

51. Algae consist of ____like plant body
(a) hyphae **(b) thallus** (c) coiled (d) flagella

52. _____is a unicellular alga.
(a) Spirogyra (b) Laminaria **(c) Chlorella** (d) Fucus

53. Siliceous walls are seen in____
(a) Red Algae **(b) Diatoms** (c) Brown Algae (d) Fungi

54. bas medicinal properties to cure I pulmonary tuberculosis_____
(a) Sphagnum **(b) Marchantia** (c) Riccia (d) Pellia

55. Bryophytes completely lack _____
(a) **vascular tissue system** (b) pith (c) pericycle (d) cambium

56. _____is used in nurseries.
(a) Liverworts **(b) Sphagnum** (c) Riccia (d) Funaria

57. Star shaped chloroplast is seen in_____
(a) **Zygnema** (b) Spirogyra (c) Chlamydomonas (d) Chlorella

58. _____is used in space travel.
(a) Fucus (b) Laminaria (c) Gelidium **(d) Chlorella**

59. "Pteridophytes are primitive seedless vascular plants and are also called ____
(a) **Cryptogams** (b) Angiosperms (c) Cryophytes (d) Fungi

60. ___ are called vascular cryptogams.
(a) Fungi (b) Algae **(c) Pteridophytes** (d) Bryophytes

61. ___ is a characteristic feature of pteridophytes.
(a) Absence of vascular tissues **(b) Heterospory** (c) Capsule (d) Protonema

62. Which one of the following is N -fixing cyanobacteria?
(a) Gnetum (b) Sequoia **(c) Anabaena** (d) Thuja

63. _____are naked seeded plants
(a) **Gymnosperms** (b) Bryophytes (c) Algae (d) Pteridophytes

64. In gymnosperms pollination occurs by____
(a) rain (b) insect (c) water **(d) wind**

65. __ is a alga found on shell of molluscs.
(a) Ulva **(b) Cladophora** (c) Oedogonium (d) Funaria

66. _____is a halophytic alga.
(a) Chlamydomonas (b) Gelidium **(c) Dunaliella** (d) Vaucheria

67. Identify the odd one based on vegetative reproduction in algae.
(a) Akinetes (b) Bulbils **(c) Zoospores** (d) Fission

68. Scalariform conjugation is seen in _____
(a) Nostoc **(b) Zygnema** (c) Ulothrix (d) Volvox

69. A unicellular form in Red algae ____
(a) **Porphyridium** (b) Porphyra (c) Corollina (d) Goniotrichum

70. The presence of cap cell is characteristic of,_____
(a) Chara (b) Gelidium c) Cladophora **(d) Oedogonium**

71. Stone wort refers to _____
(a) **Chara** (b) Gelidium (c) Anabaena (d) Chlamydomonas

72. Turpentine is got from _____
(a) Ephedra **(b) Pinus** (c) Agathis (d) Araucaria

73. _____after fertilization becomes a seed.
(a) Ovary (b) Megaspore **(c) Ovule** (d) Microsporangium

74. The Father of Indian Phycology is ____
(a) Whittaker **(b) M.O.P.Iyenger** (c) Hippocrates (d) John Ray

75. The Father of Indian Bryology is ____
(a) Hippocrates (b) John Ray **(c) Shiv Ram Kashyap** (d) M.O.P. Iyengar

76. The Father of Indian Paleobotany is_____
(a) M.O.P. Iyengar **(b) Birbal Sahni** (c) Shiv RamKashyap (d) Ramaniyam

77. Bulbils occur in the alga ____
(a) Pithophora (b) Chlorella **(c) Spharcelaria** (d) Chlamydomonas

78. Tubers store food materials in _____
(a) Oedogonium **(b) Chara** (c) Ulothrix (d) Fucus

79. Air bladders are seen in____
(a) Fucus (b) Ulva **(c) Sargassum** (d) Vaucheria

80. Thick walled aplanospores are called_____
(a) akinete (b) hormogone **(c) hypnospore** (d) tetraspore

81. The oldest recorded alga is ___
(a) **Grypania** (b) Gnetum (c) Pandorine (d) Volvox

82. Among Brown algae,____is a fresh water form.
(a) Fucus **(b) Pleurocladia** (c) Dictyota (d) Ulva

83. _____ is commonly called sea palm.
(a) Gelidiella **(b) Postelia** (c) Gracilaria (d) Dunaliella

84. Which one of the following is belongs to the members of Chlorophyceae?
(a) **Green algae** (b) Brown algae (c) Red plants (d) All the above

85. _____is a green alga employed in Biofuel production.
(a) **Botryococcus** (b) Chlorella (c) Kappaphycus (d) Ceramium

86. Shiv Ram Kashyap has done a lot of work on_____
(a) Pteridophytes **(b) Bryophytes** (c) Algae (d) Fungi

87. Institute of palaeobotany is located in __
(a) Delhi **(b) Lucknow** (c) Meerut (d) Agra

88. A plant secretion that is a efficient preservative_____
(a) Agar Agar (b) Careegenin **(c) Amber** (d) Ergot

89. ___ is a liana.
(a) Gnetum (b) Cycas **(c) Pine** (d) Adiantum

90. Xylem vessels are seen in ____
(a) Selaginella **(b) Gnetum** (c) Cycas (d) Pinus

91. _____is used as fodder.
(a) Chara **(b) Fucus** (c) Chlorella (d) Chlamydomonas

92. In which algae reserve food is in the form of laminarin?
(a) **Brown algae** (b) Red algae (c) Green algae (d) All the above

93. The sporophytes of bryophytes are called _____
(a) **Sporogonium** (b) Sporangium (c) Oogonium (d) Antheridium

94._____is a saprophytic Bryophyte.
(a) **Buxbaumia** (b) Marchantia (c) Anthoceros (d) Funaria

95._____is not included pteridophytes.
(a) Club moss (b) Quill worts **(c) Kelps** (d) Horsetails

96.Vessels are seen in_____
(a) Equisetum **(b) Selaginella** (c) Marsilea (d) Pteris

97.Siphonostele occurs in the pteridophyte _____
(a) Selaginella **(b) Marsilea** (c) Equisetum (d) Lycopodium

98.Green dye is obtained from _____
(a) **Pteridium** (b) Equisetum (c) Marattia (d) Azolla

99.____is employed in Bioremediation.
(a) **Pteris** (b) Pteridium (c) Marsilea (d) Rumohra

100. Assertion (A): Angiosperms and Gymnosperms show secondary growth.
Reason (R) : Cambium is present in Angiosperms and Gymnosperms.
(a) A and R are wrong (b) A is right, R is wrong
(c) A and R are right but R does not explain A **(d) A and R are right. R explains A.**

101. Amber is produced by a ___
(a) Pteridophyte **(b) Gymnosperm** (c) Algae (d) Fungi

102. Choose the corect one:

Fossil Algae	-	(A) Cooksonia
Fossil Bryophyte	-	(B) Lepidocarpon
Fossil Gymnosperms	-	(C) Dimorphosiphon
Fosil Pteridophyte	-	(D) Muscites

1 - B, 2 - C, 3 - D, 4 - A (b) 1-C ,2-B , 3-A ,4-D (c) 1 - A,2 - B, 3 - C,4 – D **(d) 1 - C, 2 - D, 3 - B, 4 - A**

103. Which of the plant group has gametophyte as a dominant phase?
(a) Pteridophytes **(b) Bryophytes** (c) Gymnosperm (d) Angiosperm

104. Choose the odd one out.
(a) Neck canal (b) Egg **(c) Antherozoid** (d) Venter

105. Which of following represent generation in pteridophytes?
(a) **Prothallus** (b) Thallus. (c) Cone (d) Rhizophore

106. The haploid number of chromosome for an Angiosperm is 14, the number of chromosome in its endosperm would be
(a) 7 (b) 14 **(c) 42** (d) 28

107. Endosperm in Gymnosperm is formed
(a) At the time of fertilization **(b) Before fertilization.**
(c) After fertilization. (d) Along with the development of embryo .

2 Marks :

1. **Define Phycology.**
   The **study of algae** is called as phycology or algology.

2. **Define alternation of generation.**
   - Altemation of the **haploid gametophytic phase** (n) with **diploid sporophytic phase** (2n) during the life cycle is called alternation of generation.

3. **Give an example for various types of Algae**
   Marine - *Gracilaria* and *Sargassum*
   Fresh water algae - *Oedogonium* and *Ulothrix*
   Endozoic algae - *Chlorella* and *Chaladophora crispata.*

4. **Define epiphytic algae .**
   - Algae **growing on the surface of aquatic plants** are called as epiphytic algae.
     Example: ***Coleochaete.***

5. **What are the composition of algae cell wall.**
   - **Cellulose and hemicellulose.**

6. **List out the criteria involved in algal classification.**
   - **Pigmentation,**
   - **Reserve food materials**
   - **Flagellation pattern.**

7. **What are pyrenoids?**
   - Pyrenoids are **proteinaceous bodies found in chromatophores** of algae and assist in the synthesis and storage of starch.

8. **Distinguish between Isogamy and Oogamy with example.**

Isogamy	Oogamy
Fusion of morphologically and physiologically **similar gametes.** *e.g. Sargassum*	Fusion of both morphologically and physiologically **dissimilar gametes.** *e.g. Ulothrix*

9. **Name reproductive organ of Rhodophyceae members.**
   - Male sex organ is called **Sperrnatangium.**
   - Female sex organ is called **Carpogonium.**

10. **Which is responsible for pigmentation of Brown algae?**
    - A golden brown pigment called **fucoxanthin** is present and it gives shades of colour from **olive green to brown** to the algal members of **Phaeophyceae.**

11. **List out the algae used in Agar-Agar production.**
    Gracilaria and ***Gigartina.***

12. Why Bryophytes are called as amphibians of plant kingdom ?

- 'Bryophytes are called as 'amphibians of plant kingdom' **because they need water for completing their life cycle.**
- They live in **water and land.**

13. Why bryophytes are called as Non-vascular cryptogam?

- Vascular tissue like **xylem and phloem are completely absent** in bryophytes, hence called as **'Non-vascular cryptogams'.**

14. Write short note on sexual reproduction in Bryophytes.

- Sexual reproduction is **Oogamous.**
- Male sex organ is called as **Antheridia.**
- Female sex organ is called as **Archegonia.**

15. What are sporophylls?

- Sporophylls are the special leaves on which **spore bearing sporangia** are borne.
- Sporophylls organize to **form strobilus or cone.**

16. Compare Eusporangiate and Leptosporangiate.

Eusporangiate	Leptosporangiate
Development of sporangium **from group of initials**	Development of sporangium **from single initial**

17. Differentiate homospory and heterospory with example.

Homospory	Heterospory
Production of **one type of spores.** *e.g..Selaginella*	Production of **two types of spores.** *e.g. Lycopodium*

18. Which period, does the pteridophytes dominate the surface?

- Devonian period of **Paleozoic era.**

19. List out the ways of vegetative propagation by Pteridophytes.

- **Fragmentation,**
- **Resting buds,**
- **Root tubers**
- **Adventitious buds.**

20. Define Stele & mention its types.

- Stele refers to the central **cylinder of vascular tissues consisting of xylem, phloem, pericycle** and sometimes medullary rays with pith.

Types : 1. **Protostele** - In protostele, **xylem surrounds phloem.**
2. **Siphonostele** - In siphonostele, **phloem surrounds xylem.**

21. Define Eustele.

The stele is split into distinct **collateral vascular bundles around the pith.** Eg: Dicot stem.

22. What is amber? Which group of plants produce amber?

- Amber is a **plant secretion that is a efficient preservative** that doesn't get degraded and hence can **preserve remains of extinct life forms.**
- The amber is produced by ***Pinites succinifera,*** a Gymnosperm.

23. Which period, does the gymnosperm dominate the earth?

Jurassic and Cretaceous periods of Mesozoic era.

24. Distinguish between Manoxylic & Pycnoxylic.

Manoxylic	Pycnoxylic
Porous, soft wood	**Compact hard wood**
More parenchyma with **wide medullary rays.**	Compact with **narrow medullary rays.**

25. Define Siphonogamous condition.

- Siphonogamy refers to the **development of pollen tubes** for the transfer of male nuclei to egg cell.

26. What is Canada balsam ?

- **Canada balsam** is a resin obtained from *Abies balsamea.*
- It is used as **mounting medium** in permanent slide preparation.

27. Why do we use the term 'form genera' for fossil plants?

- The term 'form genera' is used to name the fossil plants because the whole plant is not recovered as fossils instead organs or patts of the extinct plants are obtained in fragments.

28. Name few fossil sites of India.

I.	**Shiwalik fossil park**	Himachal Pradesh
2.	**Mandla fossil park**	Madhya Pradesh
3.	**Rajmahal hills**	Jharkhand
4.	**Ariyalur**	Tamil Nadu

29. Mention the names of any two fossil gymnosperm.

- ***Medullosa,***
- ***Lepidocarpon***
- ***Lepidodendron.***

30. What is an open and closed vascular bundle?

Open : A vascular bundle is open when it **has Cambium.**

Closed : A vascular bundle is closed when it **does not have Cambium.**

31. Mention any two morphological differences between Dicot & Monocots.

S.No.	Dicot	Monocots
1.	Leaves show **reticulate venation**	**Leaves show parallel venation**
2.	Flowers are **tetramerous or pentamerous**	Flowers are **trimerous**

32. What are brood bodies?

- Brood bodies are the **small detachable branches** which help in vegetative propagation. *e.g., **Bryopteris fruticulosa.***

33. What are gemmae?

❖ Gemmae are **small propagative structures** which help m asexual reproduction. *e.g.,Marchantia.*

34. What are aplanospores?

❖ They are **thin walled non motile spores** produced during **asexual reproduction in algae.**
Eg: Vaucheria

35. Name the different reserve food materials in algae.

Types of Algae	Reserve Food
a) Green algae	-Starch
b) Brown algae	-Laminarin and Mann
c)Red Algae	-Floridean starch

36. What are elaters?

They are seen in the **sporophytes of bryophytes** like Marchantia and help in **dispersal of spores.**

37. Differentiate Eusporangiate and leptosporangiate development.

- **Eusporangiate Development:** The development of sporangium from a group of Initials.
- **Leptosporangiate development:** The development of sporangium from a single initial.
- Both the types are seen in Pteridophytes

38. Give examples of vegetative propagation in Bryophytes.

Bryophyte	Method of vegetative propagation
1. Anthoceros	- Tubers
2. Marchantia	- Gemmae
3. Riccia	- Fragmentation

39. Name the types of wood seen in Gymnosperms.

- **Manoxylic wood** - Porous, So , more parenchyma with wide medullary ray. Eg: Cycas
- **Pycnoxylic wood** - Compact with narrow medullary ray. Eg: Pinus

40. What is called polyembryony?

- Presence of **more than one embryo in ovule** is called polyembryony. Eg: Pinus.

41. Mention uses of algae in health care.

- Chlorella - used as **single cell protein.**
- Kelps are a rich source of **Iodine.**

42. What is diatomaceous earth?

- The siliceous frustules from the **diatoms (algae) forms** deposits under the sea.
- This is called **diatomaceous earth** and used as **water filters, insulation material** etc.

43. Name some algae used as fertilizer.

1. **Lithophyllum,**
2. **Chara,**
3. **Fucus.**

44. What are phycocolloids?

Algae like *Kappaphycas alvarezii , Gracilaria edulis* and *Gelidielh acerosa* are grown commercially in the sea for harvesting **phycocolloids** got from cell wall of algae.

45. Differentiate halpontic and diplontic life cycle.

S.No.	Haplontic life cycle	Diplontic life cycle
1.	Gametophytic phase is **dominant, photosynthetic** and **independent.**	**Sporophytic phase** (2n) is dominant, photosynthetic and independent.
2.	**Sporophytic phase is represented by the zygote. Eg: Volvox**	**The gametophytic phase is represented by the single to few celled gametophytes. Ex: Fucus sps.**

46. What are the types of Bryophytes ?

- They are classified into 3 classes by proskauer.
  1. **Hepaticopsida** - Eg : Riccia
  2. **Anthocerotopsida** - Eg : Anthoceros
  3. **Bryopsida** - Eg : Funaria

47. What is plectostele? Give example.

- **Protostele** - Protostele is a type of stele in which **xylem surrounds phloem.**
- **Plectostele** is a type of proto stele in which **xylem plates alternate with phloem plates.**
  Eg : *Lycopodium clavatum.*

48. What do you infer from the term pycnoxylic?

It refers to a type of **wood in Gymnosperms** which is compact with narrow medullary ray. Eg : **Pinus.**

49. Mention two characters shared by gymnosperms and angiosperms?

- Both plant groups **produce seeds.**
- **Presence of Eustele**
- Presence of well-organised plant body with **roots, stem and leaves.**

50. What are the different types of Chloroplast is algae. Explain

- Variation among the **shapes of the chloroplast** is found in algae and is very unique to it especially in green algae.
- They contain **chlorophyll a and b** pigments for photosynthesis.
- The chloroplasts also contain **pyrenoids** which store starch.

S.No.	Algae	Shape of chloroplast
1.	Chlamydomonas	Cup shaped
2.	Chara	Discoid
3.	Ulothrix	Girdle shaped
4.	Oedogonium	Reticulate
5.	Spirogyra	Spiral
6.	Zygnema	Stellate
7.	Mougeoutia	Plate like

51. Why Bryophytes need water for fertilization'?

- In Bryophytes **sexual reproduction occurs in Gametophyte** (dominant phase).
- The antherozoids **have flagella and swim** in a thin film of water to reach the **Archegonium.**
- They **fuse with the egg** and form the zygote which initiates the **sporophyte.**
- Thus without water the life cycle of a Bryophyte **cannot be completed.**

52. What is Taxol ?

- Drug obtained from a gymnosperm - **Taxus brevifolia** and used for cancer treatment

53. What are fossils?

- Fossils are remains of the plants and animals of the **post geological age** that occur in preserved form.

54. Why gymnosperms are called naked seeded plants?

- As in gymnosperms, the **fertilized ovule becomes** the seed but there is no ovary to bring **about fruit formation.**
- The **ovules are naked** and directly borne on the cone.
- So they are called **naked seeded plants**

55. Name the three important developments that have been made by the seed plants.

- The development of **heterospory**.
- The development of **seeds**.
- The development of **non-swimming male gametes**

56. How does fertilization occur in gymnosperms?

Fertilization is of **siphonogamous type**,
i.e., the male gametes are carried to the **archegonia through pollen tube** in gymnosperms.

57. Name the classification of angiosperms.

- The basis of the number of cotyledons angiosperms are classified into two broad groups.
- They are **i) Monocotyledonae, ii) Dicotyledonae**

58. What is alternation of generations in plants?

- **Alternation of generation** is common in all plants.
- Alternation of the haploid **gametophytic phase (n)** with diploid **sporophytic phase (2n)** during the life cycle is called **alternation of generation.**

59. Define Dicotyledons

- Seeds of dicotyledonous plants contain two cotyledons.
- Leaves show **reticulate venation.**
- Flowers are **tetramerous or pentamerous.**

60. What is unique about the endosperm of Gymnosperms?

- It is **haploid** and develops before fertilization.
- It Angiosperms it is **triploid** and develops **after fertilization**.

61. How are Gymnosperms classified?

They are classified into 3 classes by Sporne,

- **Cycadospsida**
- **Coniferopsida**
- **Gnetopsida**

62. Name two gymnosperm species used of food.

- Sago is obtained from **Cycas revoluta**.
- Roasted seeds of **Pinus gerardiana** are used as food.

63. Why snow appear to be red in colour?

- **Chlamydomonas nivalis** grow in snow covered mountains and **impart red colour** to the snow (Red snow).

64. What is Epiphytic algae? Give Examples.

- A few algae grow on the **surface of aquatic plants** and are called **epiphytic algae.**
  Eg: Coleochaete, and Rhodymenia.

65. What are the 11 classes of Algae.

F.E.Fritsch classified Algae into 11 classes namely
Chlorophyceae, Xanthophyceae, Chrysophyceae, Bacillariophyceae, Cryptophyceae, Dinophyceae, Chloromonodinae, Euglenophyceae, Phaeophyceae, Rhodophyceae, Cyanophyceae.

66. Name the methods of asexual reproduction seen in algae.

Zoospores	Ulothrix.
Aplanospore	Vaucheria..
Autospore	Chlorella.
Hypnospore	Chlamydomonas nivalis

67. What are Akinetes?

Thick walled spores meant for perennation and germinate during favourable conditions seen in algae.
Eg : Pithophora.

68. Name the sex organs seen in Rhodophyceae.

Male sex organ. - Spermatangium
Female sex organ - Carpogonium

69. Name a foliaceous alga and colonial non motile alga..

- **Foliaceous alga** - Ulva
- Colonial non motile alga – Hydrodictyon

70. What are autospores?

They are **asexual spores which look similar to parent** cell. Eg: Chlorella

71. What are cryptogam? Mention its division.

Cryptogams are **non-flowering or non-seed producing plants.**
It has been divided into **Algae, Bryophytes and Pteridophytes.**

72. In which group of plants we can observe Haplodiplantic life cycle? Draw a diagram of Haplodiplontic life cycle.

73. Name the 3 types of life cycles seen in plants?

Haplontic life cycle
Diplontic life cycle
Haplodiplontic life cycle

74. Where can we see cryophytic & halophytic algae? Give example.

Cryophytic algae **grow on snow**. *e.g., Chlamydomonas nivalis.*
Halophytic algae **grow in salt pans**. *e.g., Dunaliella salina.*

75. List out the various types of vegetative reproduction seen in algae.
Fission, fragmentation, budding, bulbils. tubers.

76. List out the various asexual spores produced by algae.
- Zoospores,
- Aplanospores.
- Autospores,
- Hypnospores,
- Tetraspores
- Akinetes.

77. Define exoscopic embryogeny.
In exoscopic embryogeny, the first division of the zygote is transverse & fom1 inner and outer cell. The apex of the embryo develops from outer cell.

78. Name the three classes of Bryophytes.
Hepaticopsida, Anthocerotopsida and Bryopsida.

79. Name the three classes of gymnosperms.
Cycadospsida, Coniferopsida and Gnetopsida.

80. Where can we see cryophytic & halophytic algae? Give example.
- Cryophytic algae grow on snow. *e.g., Chlamydomonas nivalis.*
- Halophytic algae grow in salt pans. *e.g., Dunalie/la salina.*

81. Define exoscopic embryogeny.
In exoscopic embryogeny, the first division of the zygote is transverse & form inner and outer cell. The ape from outer cell.

3 Mark Questions

82. Write any three differences between chlorophyceae and phaeophyceae members?

	Chlorophyceae	Phaeorhyceae
(a)	Commonly called as **green algae**	Commonly called as **brown algae**
(b)	**Chlorophyll 'a' and 'b'** are the major ph	**Chlorophyll a, c carotenoid, Xanthophylls** are the photosynthetic pigments
(c)	Reserve food in **starch**	Reserve food in **mannitol and laminarin starch**

83. How peat is obtained? Write its economic value.
- A large amount of dead thallus of Sphagnum gets **accumulated and compressed, hardened** to form peat.
- It is used as fuel in **commercial scale** (Netherlands).
- **Nitrates, brown dye** and **tanning materials** are derived from peat.
- Sphagnum and peat are also used in horticulture as packing material because of their **water holding capacity.**

84. Mention any three Pteridophytes and their economic value.

S.No.	Pteridophyte	Uses
1.	*Marsilea*	Food
2.	*Azolla*	Biofertilizer
3.	*Pteris vittata*	Removal of heavy metals from soils- Bioremediation

85. How the vascular plants dominate the Earth?

- The success and dominance of vascular plants is due to the development of.
  1. Extensive root system.
  2. Efficient conducting tissues.
  3. Cuticle to prevent desiccation.
  4. Stomata for effective gaseous exchange.

86. Name any three economically important products & uses of the gymnosperm plants.

S.No.	Plants	Products	Uses
I.	*Taxus brevifolia*	Taxol	Drug used for cancer treatment
2.	*Ephedra gerardiana*	Ephedrine	For the treatment of asthma and bronchitis
3.	*Pinus roxburghii*	Oleoresin	Used to make soap, varnishes and printing ink

87. Compare the anatomical features between Dicots & Monocots.

S.No.	Dicots	Monocots
I.	Vascular bundles are arranged in the form of ring in stem	Vascular bundles are scattered in stem
2.	Vascular bundles are open	Vascular bundles are closed
3.	Secondary growth is present	Secondary growth is absent

Answer Type Questions (5 Marks)

1. Explain in detail about the various life cycle patterns in plants.

Life cycle patterns in plants:

Alternation of Generation:Alternation of generation is common in all plants. Alternation of the haploid gametophytic phase (n) with diploid sporophytic phase (2n) during the life cycle is called alternation of generation. Following type of life cycles are found in plants.

Haplontic life cycle: Gametophytic phase is dominant, photosynthetic and independent, whereas sporophytic phase i s represented by the zygote. Zygote undergoes meiosis to restore haploid conditi *Spirogyra.*

(b) Diplontic life cycle: Sporopbytic phase (2n) is dominant, photosynthetic and independent. The gametophytic phase is represented by the single to few celled gametophytc. The gametes fuse to form zygote which develops into sporophyte. *e.g., Fucus,* gymnosperms and angiosperms.

(c) Haplodiplontic life cycle: This t)pe of life cycle is found in Bryophytes and pteridophytes hich is intermediate between haplontic and diplontic type. Both the • phases arc multicellular, but they differ in their dominant phase.

(a) (b) (c)

Life cycle patterns in plants (a) Haplontic, (b) Diplontic, (c) Haplo-diplontic

2. What are Corolloid roots?

- The lateral roots of Cycas give rise to vertical branches under the soil.
- They branch repeatedly to form dichotomously branched coral-like roots called corolloid roots.
- It contains Blue green algae, **Anabaena** which helps in Nitrogen fixation.

3. What is the contribution of prof. Birbal Sahni?

- He is the father of Indian Palaeobotany.
- He described Fossils plants from Rajmahal Hills of Eastern Bihar.
- He described many form genera.
- Eg : **Pentoxylon sahni , Nipanioxylon.**

4. Mention three salient features of Brown algae.

- The thallus is di erentiated into leaf like photosynthetic part' called frond, a stalk like structurecalled stip
- A part from Chlorophylls, Carotenoids and Xanthophylls, a golden brown pigment calledfucoxanthin is pr
- Mannitol and Laminarin are the reserve food materials.
- The term 'form genera' is used to name fossil plants - Explain.
- The whole plant is not recovered as fossils.
- Instead organs or parts of the extinct plants are obtained in fragments.
- Hence the term 'form genera' is used to name fossil plants

5. List the di erence between the microsporophyll and megasporophyll.

S.No.	Microsporophyll	Megasporophyll
1.	It bears microsporangia	It bears megasporangia.
2.	It contains numerous microspores.	It usually contains one megaspore.
3.	Microspores are released.	Megaspores are retained inside megasporangium.

6. Define Monocotyledons.

- Seeds of monocotyledonous plants contain only one cotyledon.
- Leaves show parallel venation.
- Flowers are trimerous.
- These plants have fibrous root system.

7. **How are pteridophytes classified?**
   - The Pteridophytes are divided into five subdivisions by Reimer.
   - Psilophytopsida
   - Psilotopsida
   - Lycopsida
   - Sphenopsida
   - Pteropsida.

8. **Differentiate Gymnosperms and Angiosperms.**

S.No	Gymnosperms	Angiosperms
1.	Vessels are absent [except Gnetales]	Vessels are present
2.	Phloem lacks companion cells	Companion cells are present
3.	Ovules are naked	Ovules are enclosed within the ovar

9. **Classify the following as gametophyte or sporophyte generation**

	Answer
Thallus of Marchantia	*Gametophyte generation*
Spore of Funaria	*Sporophyte generation*
Plant of Pteridophytes	*Gametophyte generation Flagella*
Prothallus of Adiantum	*Gametophyte generation*
Zygote of Selaginella	*Sporophyte generation*
Microspore of Selaginell	*Gametophyte generation*
Pollen of Cycas	*Gametophyte generation*
Embryo of Pinus	*Sporophyte generation*

10. **Both gymnosperms and angiosperms bear seeds But,why are they classified separately?**
- Gymnosperms and angiosperms are classified separately because, Ovules in gymnosperms are naked. In angiosperms, they are enclosed inside the ovary. Further Wood is non-porous in gymnosperm, ie., the vessels are absent. Wood in angiosperms is porous. ie., the vessels are present.
- Angiosperms support pollinators to carry out pollination in contrast to gymnosperms. Give reasons.
- In gymnosperms, pollination is carried out only by wind.
- Flowers in angiosperms have showy petals, nectaries, scent glands and several other devices toattract the insects, birds and other animals including man to help them to get pollinated.
- A seed enclose three generations one within the others. Justify the statement.
- A seed enclose three generations one within the other:
- The ovule or megasporangium formed from the parent sporophyte is diploid (2n).
- An ovule consist of integument and nucleus. Both of them are diploid and belongs to sporophyticgeneration.

- The megaspores developing within the ovule is formed by meiosis and is haploid(n). The megasporedevelops into haploid female gametophyte which develops an egg (n).
- This represents haploid(n) gametophytic generation. The egg is then fertilized by a male gamete, toform a diploid (2n) zygote.
- The Zygote then develops into an embryo or future sporophyte (2n).

11. Why are some bryophytes are called liverworts?

- Some bryophytes are called as liverworts because their gametophyte resembles with lobes of the liver.
- A er a forest fire, when above ground plant parts are killed ferns are o en one first plants to appear? Why?
- On the Forest floor, fern stems live safely tucked below the ground.
- They survive moderate fires even if all fronds are bumtaway.
- Once rains come and light is available, and when nutrients get released a er the fire, new fronds areproduced easily.
- Thus ferns are offen the first plants to grow after a fire.

12. Ginkgo biloba is called living fossil?

- Ginkgo biloba has not charged for last several millions of years. So it is also called living fossil.

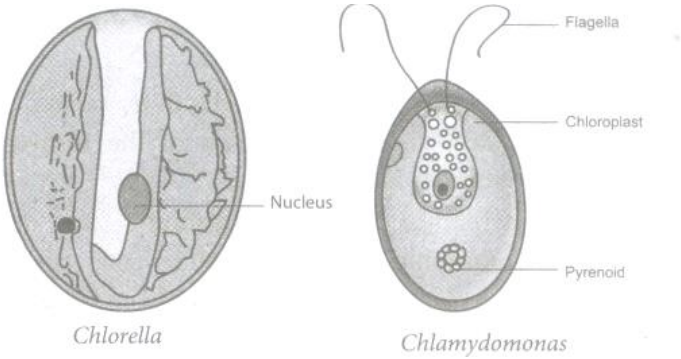
Heterospory is a development towards seed habit Do you agree?

- 1.Yes Production of two types of spores by a plant is called heterospory. Eg : Selaginella.
- 2.Large spores are called megaspores and small spores are called microspores. Megaspore → Female gametophyte →Archegonia →egg. Microspore →Male gemetophyte →Antheridia →Antherozoids.
- 3.The two gametophytes remain protected inside the respective spores in the sporophytic phase.
- Microspores are dispersed by wind and reach the Megaspore. The Antherozoid fuses with the egg toform zygote.
- Thus the gametophytic generation is completed in the sporophyte plant itself. Only a er zygoteformation the female gametophyte is shed from the sporophyte.
- This is a basic requisite for seed habit.
- Distinguish apogamy and apospory.
- **1.Apogamy** - A type of reproduction occuring in some ferns in which the sporophyte develops from the gametophyte without fusion of gametes.
- **2.Apospory** - The development of a gametophyte directly from a sporophyte without the occurrence of mieosis or spore formation.
- Both apogamy and apospory are seen in pteridophytes.
- Why do mosses thrive only in moist habitat?
- Mosses (bryophytes) are non-vascular land plants of moist habitat that grow densely together ando en form green carpets or mats on damp soil.
- It is because in the absence of roots, thallus absorbs water and minerals directly from ground oratmosphere. Hence, they can thrive only on moist places.

4. Why bryophytes do not attain great heights?

- Bryophytes seldom achieve great heights. The possible reasons are:
- Absence of roots.
- Materials are transported from cell to cell.
- Absence of vascular tissues.
- Absence of cuticle on the plant body.
- Requirement of external sheet of water for capillary conduction to all parts and transport of malegametes

- Write down the characteristic features of:Chlorophyceae.
- The members are commonly called 'Green algae'. Most of the species are aquatic (Fresh water Spirogyra, Marine - Ulva). A few are terrestrial (Trentipholia).
- Variation among the shape of the chloroplast is found in members of algae. It is Cup shaped(Chlamydomonas); Discoid (Chara); Girdle shaped (Ulothrix); Reticulate (Oedogonium); Spiral (Spirogyra); Stellate (Zygnema); Plate like (Mougeoutia).
- Chlorophyll a and Chlorophyll b are the major photosynthetic pigments.
- Storage bodies called pyrenoids are present in the chloroplast and store starch. They also containproteins.
- The cell wall is made up of inner layer of cellulose and outer layer of Pectin.
- 6.Vegetative reproduction takes place by means of fragmentation and asexual reproduction is by the production of zoospores, aplanospores and akinetes.
- 7.Sexual reproduction is present and may be isogamous, anisogamous or Oogamous.Eg: **Chlorella, Chlamydomonas, Volvox, Spirogyra, Ulothrix, Chara and Ulva.**



13. **Write down the characteristic features of Phaeophyceae.**

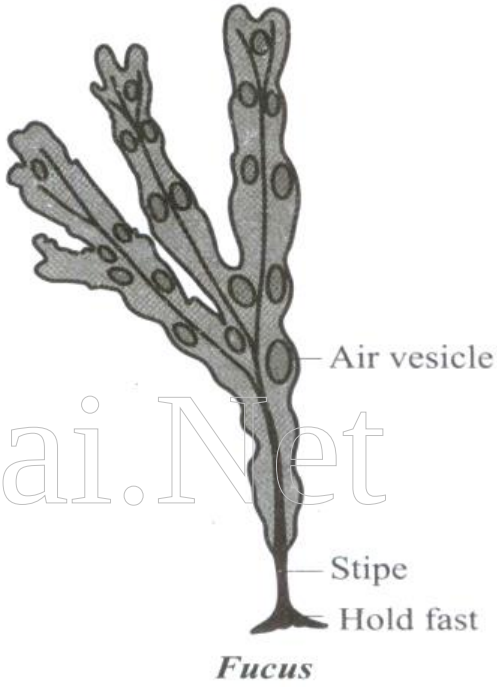
- The members of this class are called **'Brown algae'**. Majority of the forms are found in marine habitats. **Pleurocladia** is a freshwater form.
- The thallus is filamentous **(Ectocarplls)** frond like **(Dictyota)** or maybe giant kelps **(Laminaria: and Macrocystis).**
- The thallus is di erentiated into leaf like photosynthetic part called fronds, a stalk like structurecalled stipe and a holdfast which attach thallus to the substratum.
- The Pigments include **Chlorophyll a, c, carotenoids** and **Xanthophylls**. A golden brown pigment called **fucoxanthin** is present and it gives shades of colour from olive green to brown to the algal members of this group.
- **Mannitol** and **Laminarin** are the reserve food materials.
- Motile reproductive structures are present. Two laterally inserted unequal flagella are present.
- Among these one is whiplash and another is tinsel. S. Although sexual reproduction ranges' fromisogamy to Oogamy, most of the forms show Oogamous type.
- 9. Alternation of generation is present (isomorphic, heteromorphic or diplontic). Eg: **Sargassum, Laminaria, Fucus and Dictyota.**
- Write down the characteristic features of Rhodophyceae.
- Members of this group include **'Red algae'** and are mostly marine. The thallus is multicelluar, macroscopic and diverse in form.
- Porphyridium is the unicellular form. Filamentous **(Goniotrichum)** ribbon like **(Porphyra), Corollina** and **Lithothamnion** are heavily impregnated with lime and form coral reefs.
- Apart from chlorophyll a r-phycoerythrin and r-phycocyanin are the photosynthetic pigments.
- Asexual reproduction takes place by means of monospores, neutral spores and tetraspores. Thestorage product is **orldean starch.**
- Sexual reproduction is **Oogamous**. Male sex organ is spermatangium which produces spermatium. Female sex organ is called **carpogonium**.
- The spermatium is carried by the water currents and fuse with egg nucleus to form zygote.
- The zygote develops into carpospores. Meiosis occurs during carpospore formation.
- Alternation of generation is present. Eg: **Ceramium, Polysiphonia, Gelidium, Cryptonemla and Gigartina.**

14. **Write the general characteristic features of Pteridophytes.**

- Gymnosperms are naked seed bearing plants.

Salient features of Pteridophytes:

- Plant body is sporophyte (2n) and it is the' dominant phase. It is di erentiated into root, stem andleaves.
- Roots are adventitious.
- Stem shows monopodial or dichotomous I branching.
- Leaves may be microphyllous or megaphyllous.
- Stele is protostele but in some forms siphonostele is present (Marsilea).
- Tracheids are the major water conducting elements but in Selaginella vessels are found.
- Sporangia, spore bearing bag like structures are borne on special leaves called sporophyll. Thesporophylls gets organized to form cone or strobilus. Eg: Selaginella, Equisetum .
- They may be homosporous (produce one type of spores-Lycopodium) or Heterosporous (producetwo types of spores-Selaginella). Heterospory is the origin for seed habit.
- Development of sporangia may be eusporangiate I (development of sporangium from group ofinitials) or leptosporangiate (development of sporangium from single initial).
- Spore mother cells undergo meiosis and produce spores (n).
- Spore germinates to produce haploid, multicellular green, cordate shaped independentgametophytes called prothallus.
- Fragmentation, Resting buds, root tubers and adventitious buds help in Vegetative reproduction. 13. Sexual reproduction is Oogamous. Sex organs, namely antheridium and archegonium are produced on the prothallus.
- Antheridium produces spirally coiled and multi flagellate antherozoids.
- Archegonium is flask-shaped with broad venter and elongated narrow neck. The venter possessesegg or ovum and neck contain neck canal cells.
- Water is essential for fertilization. A er fertilization a diploid zygote is formed and undergoesmitotic division to form embryo.
- Pteridophytes show apogamy and apospory.



Fucus

15. Differentiate Dicotyledons from Monocotyledons.

S.No.	Dicotyledons	Monocotyledons
a	Morphological features	Morphological features
1.	Reticulate venation is present in the leaves. Presence of two cotyledons in the seed. Primary root radicle of persists as Tap root.	Parallel venation is present in the leaves. Presence single cotyledon in the seed. Radicle doesn't persist and fibrous root is present.
2.	Flowers tetramerous or Pentamerous.	Flowers trimerous.
3.	Tricolpate (3 furrow) pollen is present.	Monocolpate (1 furrow) Pollen is present.
b.	Anatomical features	Anatomical features
1.	Vascular bundles are arranged in the form of a ring in stem.	Vascular bundles are scattered in the stem.
2.	Vascular bundles are open (Cambium present).	Vascular bundles are closed (Cambium absent).

3.	Secondary growth is present.	Secondary growth is absent.

16. List out the Economic importance of Algae.

S.No.	Name of the Algae	Economic importance
1.	Chlorella, Laminaria, Sargassum, Ulva, Enteromor. ha	Food
2.	Gracilaria, Gelidiella, Gigartina	Agar Agar - Cell wall material used for media preparation in the microbiology lab .Packing canned food, cosmetic, textile paper industry.
3.	Chondrus crispus	Carrageenin - Preparation of tooth paste, paint, blood coagulant.
4.	Laminaria,Ascophyllum	Alginate - icecream, paints, flame proof fabrics.
5.	Laminaria, Sargassum, Ascophyllum, Fucus	Fodder
6.	Diatom (Siliceous frustules)	Diatomaceous earth - water filters, insulation material, reinforcing agent in concrete and rubber
7.	Lithophyllum, Chara.Fucus	Fertilizer
8.	Chlorella	Chlorellin - Antibiotic Sewage disposal Pollution indicator.
	Harmful Activity	
9.	Cephaleuros virescens	Red rust of coffee

17. Tabulate the Economic importance of Pteridophyte.

S.No.	Pteridophyte	Uses
1.	Rumohra arrangements (leather leaf fern)	Cut flower adiantiformis
2.	Azolla.	Biofertilizer
3.	Dryopteris filix-mas	Treatment for tapeworm.
4.	Pteris vittata	Removal of heavy metals from soils- Bioremediation
5.	Pteridium sp.	Leaves yield green dye.
6.	Equisetum sp.	Stems for scouring
7.	Psi/otum Lycopodium,	Ornamental plants.

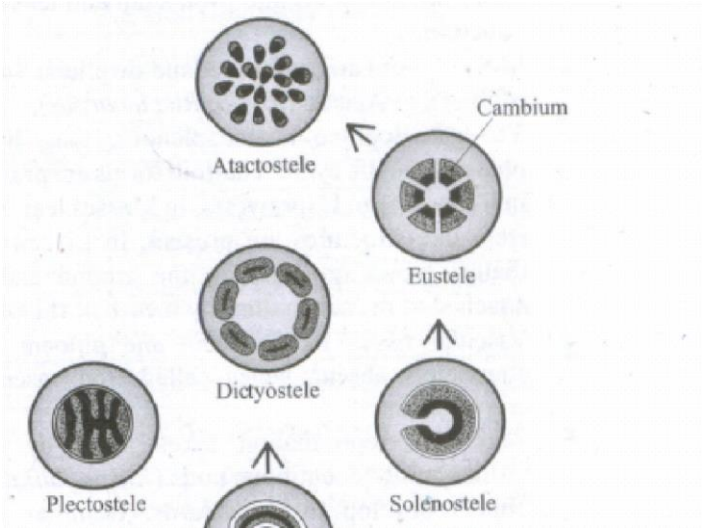
119. List out the Economic importance of Gymnosperms.

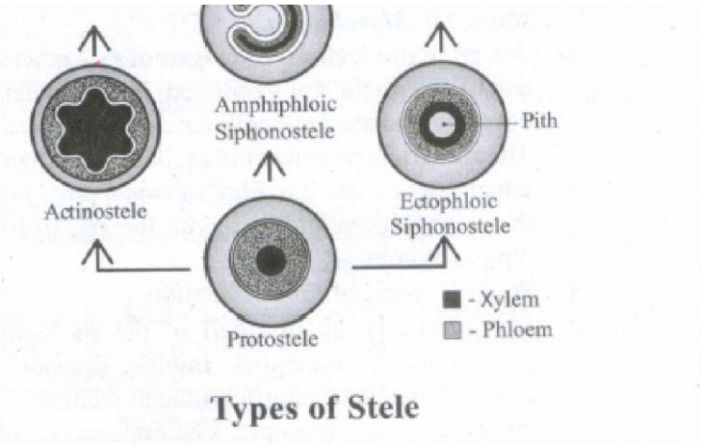
S.No	Plants	Products	Uses
1.	*Cycas circinalis, Cycas revoluta .*	Sago	Starch used as food
2.	*Pinus gerardiana*	Roasted seed	Used as a food.
3.	*Abies balsamea*	Resin	Used as mounting medium in permanent slide
4.	*Pinus insularis, Pinus roxburghii*	Rosin and Turpentine	Paper sizing and varnishes.
5.	*Araucaria, Picea.*	Tannins	Bark yield tannins and is used in Leather industries.
6.	*Taxus brevifolia*	Taxol	Drug used for cancer treatment
7.	*Ephedra gerardiana*	Ephedrine	For the treatment of asthma, bronchitis
8.	*Pinus roxburghii*	Oleoresin .	Used to make soap, varnishes and printing ink
9.	*Pinus roxburghii,Picea smithiana*	Wood pulp	Used to make papers
10.	*Cedrus deodara*	Wood	Used to make doors, boats and railway sleepers.
11.	*Cedrus atlantica*	Oil	Used in perfumery
12.	*Thuja, Cupressus.*	Decorative	Ornamental plants.

120. Write down the different types of steles.

- The term stele refers to the central cylinder of vascular tissues consisting of xylem, phloem, pericycle and sometimes medullary rays with pith.

- There are two types of steles, 1. Protostele, 2. Siphonostele.
- **1.Protostele:**
- Protostele xylem surrounds phloem. The type includes Haplostele, Actinostele, Plectostele, and mixed protostele.
- **Haplostele:** Xylem surrounded by phloem is known as haplostele. Eg: **Selaginella**.
- **Actinostele**: Star shaped xylem core is surrounded by phloem is known as actinostele. Eg:
- **Lycopodium serratum**.
- **Plectostele:** Xylem plates alternates with phloem plates. Eg: **Lycopodium clavatum.**
- **Mixed protostele:** Xylem groups uniformly scattered in the phloem. Eg: **Lycopodium cernuum.**
- **Siphonostele:**
- In siphonostele xylem is surrounded by phloem with pith at the centre. It includes Ectophloic siphonostele, Amphiphloic siphonostele, Solenostele, Eustele, Atactostele and Polycylic stele. **(i) Ectophloic siphonostele:** The phloem is restricted only on the external side of the xylem. Pith is in centre. Eg: **Osmunda.**
- **Amphiphloic siphonostele:** The phloem is present on both the sides of xylem. The pith is in the centre. Eg: **Marsilea.**
- **Solenostele:** The stele is perforated at a place or places corresponding the origin of the leaf trace.
- **Ectophloic solenostele** - Pith is in the centre and the xylem is surrounded by phloem. Eg:
- **Osmunda.**
- **Amphiphloic solenostele** - Pith is in the centre and the phloem is present on both sides of the xylem. Eg: **Adiantum pedatum.**
- **Dictyostele** -The stele is separated into several vascular strands and each one is called meristele.
- Eg: **Adiantum capillus-veneris.**
- (iv) **Eustele:**The stele is split into distinct collateral vascular bundles around the pith. Eg: **Dicot stem.** (v) **Atactostele:**The stele is split into distinct collateral vascular bundles and are scattered in the ground tissue Eg: **Monocot stem.**
- (vi) **Polycyclicstele:**The vascular tissues are present in the form of two or more concentric cylinders. Eg: **Pteridium.**





Types of Stele

121. **Write down the similarities of Gymnosperms with Angiosperms.**

- **Gymnosperms resemble angiosperms in the following features:**
- Presence of well organised plant body which is di erentiated into roots, stem and leaves.
- Presence of cambium in gymnosperms as in dicotyledons.
- Flowers in Gnetum resemble the angiosperm male flower. The Zygote represent the first cell ofsporophyte.
- Presence of integument around the ovule.
- Both plant groups produce seeds.
- Pollen tube helps in the transfer of male nucleus in both.
- Presence of Eustele.

122. **List the salient features of Bryophytes.**

Salient features of Bryophytes :

- The plant body of bryophyte is gametophyte and is not di erentiated into root, stem and leaf likestructure.
- Most of them are primitive land dwellers. Some of them are aquatic (Riella, Ricciocarpus).
- The gametophyte is conspicuous, long lived phase of the life cycle. Thalloid forms are present inliverworts and Hornworts. In Mosses leaf like, stem like structures are present. In Liverworts thallus grows prostrate on the, ground and is attached to the substratum by means of rhizoids.
- Vascular tissue like xylem and phloem are completely absent, hence called Non vascularcryptogams.
- Vegetative reproduction takes place by the formation of adventitious buds (Riccia fiuitansi. Tubersdevelop in Anthoceros. Gemmae are formed in **Marchantia**.
- Sexual reproduction is Oogamous. Antheridia and Archegonia are produced in a protective coveringand are multicellular.
- The antheridia produces biflagellate antherozoids which swims in thin film or' water and reach thearchegonium and fuse with the egg to form diploid zygote.
- Water is essential for fertilization.
- The zygote is the first cell of the sporophyte generation. It undergoes mitotic division to formmulticellular undi erentiated embryo. The embryogeny is exoscopic. The embryo divides and give rise to sporophyte.
- The sporophyte is dependent on gametophyte.
- It is di erentiated into three recognizable parts namely foot, seta and capsule. The foot is the basalportion and is embedded in the gametophyte through which water and nutrients are supplied for the sporophyte. The diploid spore mother cells found in the capsule region undergoes meiotic division and give rise to haploid spores. In some sporophytes Elaters are present and help in dispersal of spores Eg: **Marchantia**.

- Bryophytes are homosporous.
- The zygote, embryo and the sporogonium constitute sporophytic phase. The green long livinghaploid phase is called gametophytic phase The haploid gametophytic phase alternates with diploid and shows heterologous alternation of generation.

123. Write down the Salient features of Angiosperms.

Salient features of Angiosperms:

- 1.Vascular tissue (Xylem and Phloem) is well developed.
- Flowers are produced instead of cone.
- The embryo sac(Ovule) remains enclosed in the ovary.
- Pollen tube helps in' fertilization, so water is not essential for fertilization.
- Double fertilization is present. The endosperm is triploid. Angiosperms are broadly classified intotwo classes namely Dicotyledons and Monocotyledons.
- Write the general characteristic features of Gymnosperms.
- Gymnosperms are naked **seed bearing** plants.

Salient features of Gymnosperms:

- Most of the gymnosperms are evergreen woody trees or shrubs. Some are lianas (Gnetum).
- The plant body is sporophyte and is di erentiated into root, stem and leaves.
- A well developed Tap root system is present. Coralloid Roots of Cycas have symbiotic associationwith blue green algae. In Pinus the roots have mycorrhizae. 4. The stem is aerial, erect and branched or unbranched (Cycas) with leaf scars.
- In conifers two types of branches namely branches of limited growth (Dwarf shoot) and Branches ofunlimited growth (Long shoot) is present.
- Leaves are dimorphic, foliage and scale leaves are present. Foliage leaves are green, photosyntheticand borne on branches of limited growth. They show xerophytic features.
- The xylem consists of tracheids but in Gnetum and Ephedra Vessels are present.
- Secondary growth is present. The wood may be Manoxylic (Porous, so , more parenchyma with wide medullary ray -Cycas) or Pycnoxylic (compact with narrow medullary ray-Pinus).
- They are Heterosporous. The plant may be monoecious (Pinus) or dioecious (Cycas). 10.Microsporangia and Megasporangia are produced on Microsporophyll and Megasporophyll respectively.
- Male and female cones are produced.
- Anemophilous pollination is present.
- Fertilization is siphonogamous and pollen tube helps in the transfer of male nuclei
- Polyembryony (presence of many embryo) is Present. The naked ovule develops into seed Theendosperm is haploid and develop before fertilization.
- The life cycle shows alternation of generation.The sporophytic phase is dominantand gametophytic phase is highly reduced

Lesson :2 Kingdom Animalia

1. **Multiple Choice Question**

(i) Sycon	(a) Bath sponges
(ii) Euspongia	(b) Glassrope sponge
(iii) Euplectella	(c) Scypha
(iv) Hyalonema	(d) deadman's finger
(v) Chalina	(e) Venus flower baskets

Match:

(a) (i)-(b), (ii)-(c), (iii)-(d), (iv)-(e), (v)-(a) **(b) (i)-(c), (ii)-(a), (iii)-(e), (iv)-(b), (v)-(d)**

(c) (i)-(a), (ii)-(c), (iii)-(b), (iv)-(d), (v)-(e) (d) (i)-(e), (ii)-(d), (iii)-(c), (iv)-(b), (v)-(a)

2. The symmetry exhibited in cnidarians is

(a) Radial (b) Bilateral (c) Pentamerous radial (d) Asymmetrical

3. Sea anemone belongs to phylum

(a) Protozoa (b) Porifera **(c) Coelenterata** (d) Echinodermata

4. The excretory cells that are found in platyhelminthes are

(a) Protonephridia **(b) Flame cells** (c) Solenocytes (d) All of these

5. In which of the following organisms, self fertilization is seen.

(a) Fish (b) Round worm **(c) Earthworm** (d) Liver fluke

6. Nephridia of Earthworms are performing the same functions as

(a) Gills of prawn **(b) Flame cells of Planaria** (c) Trachea of insects (d) Nematoblasts of Hydra

7. Which of the following animals has a true coelom?

(a) Ascaris **(b) Pheretima** (c) Sycon (d) Taenia solium

8. Metameric segmentation is the main feature of

(a) Annelida (b) Echinodermata (c) Arthropoda (d) Coelenterata

9. In Pheretima locomotion occurs with help of

(a) circular muscles (b) longitudinal muscles and setae

(c) circular, longitudinal muscles and setae (d) parapodia

10. Which of the following have the highest number of species in nature?

(a) Insects (b) Birds (c) Angiosperms (d) Fungi

11. Which of the following is a crustacean

(a) Prawn (b) Snail (c) Sea anemone (d) Hydra

12. The respiratory pigment in cockroach is

(a) Haemoglobin **(b) Haemocyanin** (c) Oxyhaemoglobin (d) Haemoerythrin

13. Exoskeleton of which phylum consists of chitinous cuticle?
(a) Annelida (b) Porifera **(c) Arthropoda** (d) Echinodermata

14. Lateral line sense organs occur in
(a) Salamander (b) Frog (c) Watersnake **(d) Fish**

15. The limbless amphibian is
(a) Icthyophis (b) Hyla **(c) Rana** (d) Salamander

16. Four-chambered heart is present in
(a) Lizard (b) Snake (c) Scorpion **(d) Crocodile**

17. Which of the following is not correctly paired?
(a) Humans - Ureotelic (b) Birds - Uricotelic (c) Lizards - Uricotelic **(d) Whale -Ammonotelic**

18. Which of the following is an egg-laying mammal
(a) Delphinus (b) Macropus **(c) Ornithorhynchus** (d) Equus

19. Pneumatic bones are seen in
(a) Mammalia **(b) Aves** (c) Reptilia (d) Sponges

20. Match the following columns and select the correct option.

Column - I	Column - II
(p) Pila	(i) Devil fish
(q) Dentalium	(ii) Chiton
(r) Chaetopleura	(iii) Apple snail
(s) Octopus	(iv) Tusk shell

(a) p - (ii), q - (i), r - (iii), s - (iv) **(b) p - (iii), q - (iv), r - (ii), s - (i)**
(c) p - (ii), q - (iv), r - (i), s - (iii) (d) p-(i), q-(ii), r-(iii), s-(iv)

21. In which of the following phyla, the adult shows radial symmetry but the larva shows bilateral symmetry?
(a) Mollusca **(b) Echinodermata** (c) Arthropoda (d) Annelida

22. Which of the following is correctly matched?
(a) Physalia - Portugese man of war (b) Pennatula - Sea fan
(c) Adamsia - Sea pen (d) Gorgonia- Sea anemone

23. Biradial symmetry is seen in:
(a) Star fish **(b) Comb jelly fish** (c) Sea anemone (d) Sponge

24. The special flagellated cells lining the spongocoel is:
(a) Choanocytes (b) Cridocytes (c) Nematocyst (d) Lasso cells

25. The minute pores lining the body wall of Porifera are called:
(a) Osculum (b) Podia **(c) Ostia** (d) Gills

26. The central body cavity of poriferans are:
(a) Gastrocoel (b) Coelom (c) Haemocoel **(d) Spongocoel**

27. The free swimming ciliated larval form of criclaria is:
(a) Planula larva (b) Parenchymula larva (c) Amphiblastula larva (d) Veliger larva

28. In case of flatworms the specialized excretory cells are named as:
(a) Nematocysts **(b) Flame cells** (c) Nephridia (d) Malphigian tubules

29. Nereis have lateral appendages called:
(a) Parapodia (b) Body setae (c) Foot (d) Tube feet

30. The special cells of ctenophora helps in food capture is:
(a) Cnidoblasts (b) Choanocytes (c) Flamecells **(d) Colloblasts**

31. _____ are the organs of balance in Arthropods.
(a) Nematocysts **(b) Statocysts** (c) Choanocytes (d) Cochlea

32. _____is the largest phylum o he kingdom Animalia.
(a) Annelida **(b) Arthropoda** (c) Aschelminthes (d) Echinodermata

33. The second largest animal phylum is:
(a) Ctenophora (b) Arthropoda **(c) Mollusca** (d) Coelenterata

34. The anterior head region of molluscs has got this organ which helps to test the purity of water:
(a) Ostia **(b) Ospharidiam** (c) Ossicles (d) Gills

35. The larva of Nereis is:
(a) Planula (b) Tomaria larva **(c) Trocophore larva** (d) Miracidium

36. Presence of water vascular system is the most distinctive feature of the Phylum:
(a) Mollusca (b) Sponges **(c) Echinodermata** (d) Arthropoda

37. The mantle cavity of the molluscs has got number of feather like gills, which are respiratory and excretory in function are:
(a) Book lungs (b) Trachea (c) Ambulacral system **(d) Ctenidia**

38. The phylum Hemichordata are mostly tubiculous and commonly called:
(a) Flat worms (b) Round worms **(c) Tongue worms** (d) Parasitic worms

39. The free swimming larva of Hemichordata are called:
(a) Tornaria larvae (b) Planula larvae (c) Trochophore larvae (d) Cercaria larvae

40. The tunicates are normally called:
(a) Sea squirts (b) Sea anemone (c) Sea-walnuts (d) Sea urchin

41. The chondrichthyes has got this type of gills helps for respiration:
(a) Filamentous gills **(b) Lamelliform gills** (c) Filiform gills (d) Ambnlacral system

42. The excretory organ of Chondrichthyes are:
(a) Pronephric kidneys **(b) Opisthonephric kidneys** (c) Mesonephric kidneys d) Metanephric kidneys

43. The excretory organ of Osteichthyes are:
(a) Mesonephric kidneys (b) Opisthonephric kidneys (c) Holonephric kidneys (d) Metanephric kidneys

44. The eggs of Aves are of _____ type.

(a) Microlecithal (b) Mesolecithal **(c) Megalecithal** (d) Homolecithal

45. The mature RBCs are non - nucleated in:

(a) Molluscs **(b) Mammals** (c) Fishes (d) Birds

46. Match the following

i) Flame cells - (p) Cnidoblasts

ii) Collar cells - (q) Solenocytes

iii) Hollow bones - (r) Pneumatic

iv) Stinging cells - (s) Choanocytes

(a) i-s, ii-p, iii-q, iv-r (b) i-q, ii-r, iii-s, iv-p (c) i-p, ii-q, iii-r, iv-s **(d) i-q, ii-s, iii-r, iv-p**

47. Choose the correct statement with regard to Sponges. i) They have a opening called spongocoel.

ii) They reproduce asexually by gemma formation. iii) Nutrition is intracellular.

iv) Canal system is present

(a) ii & iii **(b) iii & iv** (c) i only (d) All the above

48. Parenchymula is the larval stage of Phylum

(a) Cnidaria **(b) Porifera** (c) Coelenterata (d) Platyhelminthes

49. Match:

(i) Scoliodon	(a) Electric rav
(ii) Trvzon	(b) Stinz rav
(iii) Tomedo	(c) Lamnrev
(iv) Pristis	(d) Dozfish
(v) Petromvzon	(e) Sawfish

(a) (i)-(d), (ii)-(b), (iiil)-(a), (iv)-(e), (v)-(c) (b) (i)-(c), (ii)-(d), (iii)-(b), (iv)-(a), (v)-(c)

(c) (i)-(a), (ii)-(c), (iii)-(e), (iv)-(b), (v)-(d) (d) (i)-(c), (ii)-(e), (iii)-(d), (iv)-(b), (v)-(a)

50. Identify the feature that is unique to planaria

(a) Parasitic (b) Polyembryony **(c) Regeneration** (d) Pseudo segmentation

51. The first segmented animals to evolve were the

(a) Annelids (b) Arthropods (c) Molluscs (d) Echinoderms

52. Presence of a copper-containing respiratory pigment is seen in Phylum _____ .

(a) Echinodermata (b) Chordata **(c) Mollusca** (d) Aschelminthes

53. _____show anadromous migration

(a) Bony fishes **(b) Cyclostomes** (c) Cartilaginous fishes (d) Blue whale

54. For the first time development of four-chambered heart is seen in

(a) Tunicates (b) Urochordates **(c) Reptilia** (d) Man

55. In Aves_____ is absent

(a) Ureter (b) Kidney **(c) Urinary bladder** (d) Ovary

56. _____have a great capacity of regeneration.

(a) Physalia **(b) Planaria** (c) Trygon (d) Ctenophora

57._____ is not associated with platyhelminthes.

(a) Pseudosegmentation (b) Flame cells (c) Cercaria **(d) Comb plates**

58.Sea squirts refers to

(a) Hemichordates (b) Vertebrates (c) Jelly fishes **(d) Urochordates**

59._____is a flightless bird

(a) Sparrow (b) pitohui **(c) Kiwi** (d) Cuckoo

60. Air sacs are associated with lungs in

(a) Reptiles **(b) Birds** (c) Amphibians (d) Mammals

61.Hibernation and aestivation are seen in

(a) Amphibia (b) Aves (c) Reptiles (d) Mammals

62.SACON is located in

(a) Tirunelveli (b) Trichy (c) Madurai **(d) Coimbatore**

63._____is not a cartilaginous fish

(a) Trygon (b) Scoliodon **(c) Myxine** (d) Pristis

64.Pseudosegmentation is seen is

(a) Annelids (b) Arthropods **(c) Platyhelminthes** (d) Ascidians

65.Which of the following statements is incorrect?

(a) Radial symmetry is seen is Echinoderms (b) Taenia is a endoparasite.

(c) Fasciola is a Eucoelomate (d) Mesoglea is seen in Jellyfishes

66.Excretory organs are absent in

(a) Annelids (b) Arthropoda **(c) Echinodermata** (d) Mollusca

67.The state bird of Tamilnadu is

(a) Corvus (b) Columba **(c) Chalcophaps indica** (d) Neophron

2 Mark Questions

1. **Name two different types of larval stages in Porifera.**
   - ❖ **Parenchymula**
   - ❖ **Amphiblastula.**

2. **Define various levels of Organization of animals.**
   - ❖ All members of Kingdom Animalia are **metazoans** (multicellular animals) and **exhibit different patterns** of cellular organisation.
   - ❖ The cells of the **metazoans are not capable** of independent existence and exhibit division of labour.
   - ❖ Among the metazoans, cells may be **functionally isolated or similar kinds** of cells may be grouped together to **form tissues, organ and organ systems.**

3. **Name the layers of cells found in sponges.**
   - ❖ **Outer layer is formed of pinacocytes** (maintain the size and structure of the sponge)
   - ❖ The inner layer is formed of **choanocytes.**
   - ❖ These are **flagellated collar cells** that create and maintain water flow through the sponge thus **facilitating respiratory and digestive functions**.

4. **What is tissue level of Organization?**
   - ❖ **Cells that perform similar functions** are aggregated to form tissues.
   - ❖ The cells of a tissue **integrate in a highly coordinated fashion** to perform a common function, due to the **presence of nerve cells and sensory cells.**
   - ❖ This is **present in diploblastic animals** like cnidarians.
   - ❖ The formation of tissues is the **first step towards evolution** in animals.

5. **What is organ level of Organization from which level of animals show this type of Organization?**
   - ❖ Different kinds of **tissues aggregate to form an organ** to perform a specific function.
   - ❖ This is a further **advancement over the tissue level** of organisation
   - ❖ Its appears for the **first time in the Phylum Platyhelminthes** and seen in other higher phyla.

6. **Why are spongin and spicules important to a sponge?**
   - ❖ The body of sponges is supported by a skeleton made up of **calcareous and siliceous spicules** or spongin or both.

7. **List out the common characters of animals**
   1. On the basis of germ layers all animals will be **diploblastic** (ectoderm and endoderm) or **triploblastic** (outer ectoderm, middle mesoderm, and inner endoderm).
   2. Animals **show symmetry**. They may be **radially symmetrical or bilaterally symmetrical**. Few animals like sponges **lack symmetry**

3. Most animals **possess a body cavity** between the body wall and alimentary canal and is lined with mesoderm. This is called **coelom**. Some animals **lack coelom (acoelomate)** or have **false coelom (Pseudocoelomate).**
4. **Reproduction is seen** in all animals. (asexual/sexual).

8. Explain the features that all vertebrates have.

- Vertebrates **posses notochord** during embryonic stage only.
- The **notochord is replaced by a cartilaginous** or bony vertebral column in the adult.

9. List and explain two types of circulatory system.

The circultory system is of two types,

1. **Open type:**

   The blood remains **filled in tissue spaces** due to the **absence of blood capillaries.**

   Eg: Arthropods, Molluscs, Echinoderms, and Urochordates
2. **Closed type:**

   The blood Is **circulated through blood vessels** of varying diameters (arteries, veins, and capillaries)

   Eg: Annelids, Cephalochordates and Vertebrates.

10. What is "biradially symmetrical"?

1. Animals which possess **two pairs of symmetrical** sides are said to be biradially symmetrical.
2. Biradial symmetry is a **combination of radial and bilateral symmetry** as seen in ctenophores.

11. What is Pseudocoel?

1. If the **body cavity is not fully lined by the mesodermal epithelium**, but the mesoderm is formed as **scattered pouches between the ectoderm and endoderm.**
2. Such a body cavity is called a **pseudocoel** and is filled with **pseudocoelomic** fluid.
3. Animals that possess a pseudocoel are called **pseudocoelomates** Eg: **Round worms.**

12. Identify the structure that the archenteron becomes in a developing animal.

1. In the developing embryo during the process of gastrulation, the primary gut that is formed is called the **archenteron** or **digestive tube.**
2. It develops into the **endoderm and mesoderm** of an animal

13. Difference between Male and Female round worm.

- The female are **longer than males.**
- The hind end of the **male worm is curved**.

14. Explain 'Coelenteron'.

- In Phylum cnidaria the animals have a **central vascular cavity or coelenteron** with a single opening called **mouth or hypostome** for ingestion and egestion.
- The coelenteron serves the purpose of **digestion and circulation.**

15. Name some parasitic adaptations seen in flatworms.

- They **absorb nutrients directly** from the host through their body surface.
- Organs of attachment such as **hooks and suckers are present** which help to attach to host surface.

Eg: Taenia.

16. Explain the term metamerism.

- In Phylum Annelida, the **body is metamerically segmented**.
- The body surface is divided into **segment or metameres**.
- Internally the segments are divided from one another by partitions called **septa**.
- This phenomenon is known as **metamerism.**

17. Why are Echinoderms so-called?

- The term **'Echinos' means spiny** and 'dermos' means skin.
- These animals have a **mesodermal endoskeleton of calcareous ossicles** and hence they are called **echinoderms** or **spiny skinned animals.**

18. What is the salient feature of Phylum Echinodermata?

- Presence of **water vascular system** or ambulacral system with **tube feet or podia** is a salient feature.
- This helps in **locomotion, respiration, capture and transport of food.**

19. What are tongue worms

- The Phylum Hemichordata consists of a small group of worm like so **marine animals, mostly, tubiculous** and are commonly called **'tongue** worms'.

20. What is anadromous migration?

- **Cyclostomes are marine** but migrate to fresh waters for spawning.
- This is called **anadromous migration**.
- After reproducing they **die within a few days.**
- The larva after metamorphosis **returns to the ocean**.

21. Differentiate complete and incomplete digestive system.

S.No	Digestive System.	Incomplete Digestive System.
	Digestive system of Platyhelminthes has **only a single opening to the exterior** which serves as both mouth and anus, and hence called an incomplete digestive system.	From Aschelminthes to Chordates, all animals have a **complete digestive system with two openings**, the mouth, and the anus.

22. Differentiate protostomia and Deuterostomla.

Protostomia:

- It includes the eumetazoans in which the **embryonic blastopore develops into mouth.**

Deuterostomia:

- Eumetazoans in which **anus is formed from or near the blastopore** and the mouth is formed away from the blastopore.
- They have a **true coelom called enterocoel**, formed from the archenteron.

23. What are choanocytes?

- Choanocytes or collar cells are **special flagellated cells** lining the spongocoel and the canals in phylum Porifera.
- They help to **trap aquatic organisms** from the water that enters the sponge.

24. Why are round worms so called?

★ The body of these **worms is circular (round)** in cross section and hence are called **round worms**

25. What is ecdysis or moulting?

★ In Arthropods the body is covered by **chitinous exoskeleton** for protection and to prevent water loss, It is **shed off periodically by a process** called moulting or ecdysis

26. What is radula?

★ In phylum Mollusca the digestive system is complete and mouth contains a **rasping organ called radula** with transverse rows of **chitinous teeth for feeding**

27. List two salient features of Hemichordata.

The body is **cylindrical and divided into three regions** :

1. The **anterior Probocis** - **a short collar** and a **long trunk.**

2. Most Hemichordates are **ciliary features.**
3. They show **indirect development** with a free swimming tornaria larva.

28. Name the extra embryonic membranes.

★ **Amnion,**
★ **Chorion**
★ **Allantois**

29. What is Parazoa?

★ It is a division of the animal kingdom which includes **multicellular organisms** whose cells are loosely aggregated and **do not form tissues or organs**

30. Why is the caudal fin in bony fishes said to be homocercal?

★ The caudal fin **has equal lobes**, so it is said to be homocercal.

31. Why flatworms are called acoelomates?

1. Flatworms are called **acoelomate animals.**
2. They do not possess a **body cavity or coelom.**
3. Since there is nobody cavity in these animals their **body is solid without a perivisceral cavity.**
4. This **restricts the free movement** of internal organs. **Eg. Flatworms.**

32. What are flame cells?

★ Specialised cells called **flame cells** are seen in **Phylum Platyhelminthes.**
★ These cells help in **osmoregulation and excretion.**
★ They have **flickering cilia or flagella** for driving the absorbed excretory products.

33. Which of the chordate characteristics do tunicates retain as adults?

1. The larval stage of the tunicate possesses **all the features characteristic of chordates, a notochord, a dorsal hollow nerve cord, pharyngeal slits** and a **post-anal tail.**
2. In the adult stage the **notochord, nerve cord, and tail disappear.**

34. List the characteristic features of bony fishes.

1. Their **endoskeleton is bony.**
2. They have **swim bladder.**
3. Gills are **covered by opercula.**
4. They are found in **sea and freshwater**

35. List the functions of air bladder in fishes.

- ★ In fishes air bladder **regulates buoyancy** and helps them to float in water.
- ★ If air bladders are absent, the animals need to **swim constantly to avoid sinking.**

36. Write the characteristics that contributes to the success of reptiles on land.

1. They are **mostly terrestrial animals** and their body is covered by **dry and cornified skin** with epidermal scales which checks loss of water.
2. Most reptiles **lay cleidoic eggs** with extraembryonic membranes like **omnion, chorion, allantois, and yolk sac**, Shell around the egg **checks dessication**.
3. **Embryonic membranes enclose the embryo** and provide watery environment.
4. **Internal fertilization** method helps them to survive on land.

37. List the unique features of bird's endoskeleton.

- The endoskeleton is **fully ossified** (bony).
- The long bones are **hollow with air cavities** (pneumatic bones).

38. Write short notes on sponges?

- In sponges, the **outer layer is formed of pinacocytes** (plate like cells that maintain the size and structure of the sponge), which does the **function of muscular tissue**
- **Nerve cells and sensory cells** perform the function of nervous tissue.

39. What is the advantage of true coloem over a pseudocoelom?

- ★ The internal organs in the body **move freely in coelomic animals** and in **pseudocoelomic animals**, this restricts the free movement of internal organs and body is solid.

40. How is cephalisation advantageous to animals in finding food?

- ★ Cephalisation is the process in which **mouth, sense organs and nerve ganglia** become concentrated at the front of the animal and this enables the animals in finding food.

41. Name the embryonic layers of animals and on the basis of the origin and development.

- ★ On the basis of the origin and development, animals are classified into two categories: **Diploblastic and Triploblastic.**

42. What is diploblastic animals?

- ★ Animals in which the cells are arranged in **two embryonic layers the external ectoderm and internal endoderm** are called diploblastic animals.

- ★ In these animals the **ectoderm gives rise to the epidermis** (the outer layer of the body wall)
- ★ **Endoderm gives rise to gastrodermis** (tissue lining the gut cavity).
- ★ An undifferentiated layer present between the ectoderm and endoderm is the **mesoglea**

Eg. Corals, Jellyfish, Sea anemone

43. Define triploblastic animals with example.

- ★ Animals in which the developing embryo has **three germinal layers** are called triploblastic animals and consists of **outer ectoderm** (skin, hair, neuron, nail, teeth, etc), **inner endoderm** (gut, lung, liver) and **middle mesoderm** (muscle, bone, heart).
- ★ Most of the triploblastic animals show **organ system level of organisation**

Eg.,**Flat worms to Chordates**.

44. What is meant by symmetry?

- ❖ Symmetry is the **body arrangement** in which parts that lie on **opposite side of an axis are identical**.
- ❖ An animal's body plan results from the **animal's pattern of development**.

45. Define asymmetry with example.

- ❖ The simplest body plan is seen in **sponges.**
- ❖ They **do not display symmetry** and are asymmetryical.
- ❖ Such animals **lack a definite body plan** or are irregular shaped and any plane passing through the centre of the body **does not divide them into two equal halves** (Sponges).

46. Which animals are called acoelomates? Give example.

- ★ Animals which **do not possess a body cavity** are called **acoelomates.**
- ★ Since there is no body cavity in these **animals their body is solid without a perivisceral cavity**, this restricts the free movement of internal organs

eg. Flatworms.

47. What are called coelomates?

- ❖ **Eucoelom or true coelom** is a fluidfilled cavity that develops within the mesoderm and is lined by **mesodermal epithelium** called peritoneum.
- ❖ Such animals **with a true body cavity** are called **coelomates or eucoeloniates**.

48. What is notochord ?

- Notochord is a **mesodennally derived rod like structure** formed on the dorsal side during embryonic development in some animals.
- Based on the presence or absence of notochord, animals are classified as chordates
  a) **Cephalochordates,**
  b) **Urochordates**, Pisces to Mammalia)
  c) **Nonchordates** (Porifera to Hemichordata).

49. Write short notes on cnidoblasts ?

- The name Cnidaria is derived from **cnidocytes or cnidoblasts with stinging cells or nematocyst** on tentacles.
- Cnidoblasts are used for **anchorage, defense, and to capture** the prey.

50. What is the type of digestive system found among flatworms?

- Some of the parasitic **flatworms absorb nutrients** directly from the host through their body surface.
- However, **flatworms like liver fluke have an incomplete digestive system** which means it has only single opening to the exterior which serves as both mouth and anus.

51. Define metamerism.

- The body of the annelids are **metamerically segmented** and the body surface is divided into **segment or metameres.**
- Internally the segments are divided from **one another by partitions** called septa.
- This phenomenon is known as **metamerism**.

52. Why are certain marine animals termed as echinoderms?

- All Echinoderms are **marine animals.**
- These animals have a **mesodermal endoskeleton of calcareous ossicles** and hence the name Echinodermata.

53. What is the most typical feature of echinoderms ?

- The most distinctive feature of echinoderms is the presence of the **water vascular system or ambulacral system** with **tube feet or podia**, which helps in **locomotion, capture** and **transport of food** and **respiration.**

54. What is the special character seen in cyclostomes during spawning?

- ★ Cyclostomes are **marine but migrate to fresh waters** for spawning (anadromous migration).
- ★ After reproducing within a **few days they die.**
- ★ The larvae (**ammocoete**) after metamorphosis **returns to the ocean**.

55. What is the advantage of closed circulatory system

- ★ In closed circulatory system, the circulation is **controlled by contraction of the heart**.
- ★ **Blood flows faster** and at **high pressure.**

56. How is the shape of the body maintained in Phylum Annelida?

- ➢ Coelomic fluid acts as **hydrostatic skeleton** which helps to maintain the shape of the body

57. Why is Limulus called living fossil

- ➢ **Limulus or the King crab** continues to remain unchanged for past 190 million years.
- ➢ Hence it is called **living fossil**

58. What are stinging cells or nematocysts?

1. The name of phylum Cnidaria is derived from **cnidocytes** or **cnidoblasts** with stinging cells or nematocyst on tentacles.
2. Cnidoblasts are used for **anchorage, defense, and to capture the prey.**

59. What is metagenesis?

- ❖ Some **Cnidarians exhibit two phases** in their life cycle.
- ❖ Asexual phase called **polyp** and sexual phase called **medusa**.
- ❖ They thus show alternation of generation or **metagenesis**.

60. What are comb Jellies or sea walnuts

- ❖ The Ctenophores have **eight external rows of ciliated comb** plates (comb jellies) in the mesoglea which help in locomotion.
- ❖ Hence they are commonly called as **comb jellies or sea walnuts.**

61. Mention three salient features of phylum Ctenophora.

1. **Bioluminescence** (the ability of a living organism to emit light) is well marked in **Ctenophores.**
2. They **lack nematocyte** but possess special cells called **lasso cells or colloblasts** to capture food.
3. They show **indirect development** and the larva is called **cydippid.** Eg: Pleurobrachia

3 Mark Questions

1. **How is cephalisation advantegeous to animals in finding food?**
   - Differentiation of a **definite head at the anterior** end is called **cephalization.**
   - The nervous tissue is **concentrated** is the head (brain) with **formation of sense organs.**
   - Since the head forms the anterior part of the body, **cephalization helps the animal to sense** the surrounding with the help of sense organs.
   - They can **detect source of food** and also **protect** themselves from enemies.
   - Formation of head also leads to **formation of apperdages** such as antennae which will be of use in finding food.

2. **Write short notes on sponges? And its significance.**
   - **Absence of nervous and muscular tissue** indicates that sponges must have been one of the **earliest forms in the course of evolution.**
   - **Absence of tissues** indicate that the body organisation would have been at **cellular level only without cells forming compact tissues.**
   - Further this also indicates that **sponges do not show locomotion** since they have **no means of evaluating the surrounding** because they lack muscular tissue.
   - They are **sedentary** since they **lack muscular tissue**

3. **List out the Advantages and Disadvantages of Direct Development**
   1. The **young ones resemble the adult** directly and no larval stages occur.
   2. The eggs of these **animals have lot of yolk** for the young ones to grow or are fed by the mother's tissues (human being) in the larval stages.
   3. **Parental care is seen** in many cases.

   Disadvantages:
   1. Since the parents and young ones are **found in the same habitat** they have to share the same resources.
   2. In case of calamities/disasters, they will **die together.**

3. **List out the Advantages and Disadvantages of indirect Development**

   Advantages :
   1. The larval forms are much different from the **adult and thrive on different food resources**
   2. They also **grow in a different ecological habitat.**
   3. Hence in case of calamities, they **may continue to exist even if the adults** die.

4. Indirect development is a **better means for the species** to survive.

Disadvantages:

1. Chances of all **larvae developing into adult** cannot be assumed.
2. Eggs have **very little yolk.**
3. **Parental care** is not seen.

4. All vertebrates are chordates but all chordates are not vertebrates. Justify this statement.

- All vertebrates possess three salient features of chordates:
- **Presence of Notochord.**
- Presence of **dorsal, hollow nerve cord.**
- Presence of **pharyngeal gill slits** in some stage of their life cycle.

Hence all vertebrates are chordates.

All chordates are not vertebrates:

- Primitive chordates have only a notochord which is **not replaced by vertebral column** as seen in vertebrates.

Hence all chordates are not vertebrates

5. Peripatus is called connecting link between Phylum Annelida and Phylum Arthropoda. Give reason.

1. Peripatus has **Annelidan characters → jointed parapodia and nephridia.**
2. **Arthropods characters → haemocoel, head with compound eyes** etc.
3. Thus it is said to be a connecting link between Phylum Annelida and Phylum Arthropoda

6. Name the 'Exoskeletal structures found in the following animals

a) **Cockroach** - Chitinous outer covering exoskeleton
b) **Human being** - Epidermal hair, nails
c) **Garden lizard** - Epidermal scales
d) **Snail** - Calcareous Shell
e) **Dog** - Epidermal hair, nails, hoofs.

7. Name four different respiratory organs that you have come across in the animal kingdom. Give example.

Respiratory mode	Example
1. Skin (Cutaneous respiration)	**Amphibians**
2. Lungs (Pulmonary respiration)	**Mammals**
3. Trachea (Tracheal respiration)	**Insects**
4. Gills (Branchial respiration)	**Fishes**

8. Name the excretory organs found in different animals (any four with examples).

Excretory organ	Animal
1. Flame cells /Solenocytes	Flatworms
2. Nephridia	Annelids
3. Malpighian tubules	Insects
4. Kidneys	Vertebrates
5.Green glands	Crustaceans

9. Write about the radial symmetry with suitable diagram.

- Symmetrical animals have **paired body parts** that are arranged on either side of a plane passing through the central axis.
- When any plane passing through the **central axis of the body divides an organism into two identical parts**, it is called **radial symmetry.**
- Such radially symmetrical animals have a top and bottom side but **no dorsal (back) and ventral (abdomen) side, no right and left side**.
- They have a **body plan** in which the body parts are **organised in a circle around an axis.**
- It is the principal symmetry in **diploblastic animals.**
- Cnidarians such as **sea anemone** and **corals** are radially symmetrical.
- However, triploblastic animals like **echinoderms,Starfish** have five planes of symmetry and show **Pentamerous radial symmetry**.

10. What is bilateral and biradial symmetry? Give examples.

- Animals which possess **two pairs of symmetrical** sides are said to be biradially symmetrical.
- Biradial symmetry is a **combination of radial and bilateral symmetry** as seen in ctenophores.
- There are only two planes of symmetry**, one through the longitudinal** and **sagittal axis** and the other through the longitudinal and transverse axis.
  eg. Comb jellyfish - Pleurobrachia.
- Animals which **have two similar halves** on either side of the central plane show **bilateral symmetry**.
- It is an advantageous type of symmetry in **triploblastic animals**, which helps in **seeking food, locating mates and escaping** from predators more efficiently.
- Animals that have **dorsal and ventral sides**, **anterior and posterior ends**, **right and left sides** are bilaterally symmetrical.

11. How the kingdom animalia is classified broadly in to sub-kingdoms?

Animal kingdom is divided into two sub-kingdoms, the **Parazoa and Eumetazoa** based on their organization.

1. **Parazoa:** These include the **multicellular sponges** and their cells are loosely aggregated and **do not form tissues or organs.**
2. **Eumetazoa:** These include **multicellular animals** with **well defined tissues,** which are organised as organs and organ systems.
3. Eumetazoans includes two taxonomic levels called **grades**. They include **Radiata and Bilateria**.

12. Write about the 'Division level' Classification of Bilateria.

The eumetazoans **other than Radiata**, show **triploblastic, bilaterally symmetrical** and **organ level of organisation**

The grade Bilateria includes two taxonomic levels called Division.

Division: 1 Protostomia (Proto: first; stomium: mouth):

- Protostomia includes the eumetazoans in which the embryonic blastopore develops into mouth.
- This division includes three subdivisions namely acoelomata, pseudocoelomata and schizocoelomata.

Division: 2 Deuterostomia (deuteron: secondary):

- Eumetazoans in which **anus is formed from or near the blastopore** and the **mouth is formed away** from the blastopore.
- It includes only one subdivision **Enterocoelomata**.
- They have a **true coelom** called enterocoel, formed from the **archenteron.**

13. Write about the canal system found in Porifera.

- They possess a **water transport system or canal system**
- (water enters through minute pores called **ostia** the water enters into a **central cavity** (spongocoel) and goes out through the **osculum**.
- This water transport system is helpful in **food gathering, circulation, respiration and removal of waste.**

14. Write few examples for the phylum, Arthopoda. (Any 6)

i Limulus (King crab, a living fossil)
ii Palamnaeus (Scorpion)
iii Eupagarus (Hermit crab)
iv Apis (Honey bee)
v Musca (House fly)
vi Anopheles, Culex, Aedes (mosquitoes)
vii Apis- (Honey bee), Bombyx (Silk worm)
viii Laccifer (Lac insects)
ix Living fossils Limulus-(King crab)

15. Write the functions of the following: (i) Ctenidia, (ii) Ospharidiam.

1. **Ctenidia:**
   Mandle cavity has a **number of feather like gills** (ctenidia) are present, which are **respiratory in function.**
2. **Ospharidiam:**
   The anterior head regim of molluscs has **ospharidium** to **test the purity of water** and present in bivalves and gasropods.

16. Give an account of the General features of subphylum caphalochorelata.

- Cephalochordates are **marine forms**, found in shallow waters, leading a **burrowing mode of life**.
- They are small fish like coelomate forms with chordate characters such us **notochord, dorsal tubular nerve cord** and **pharyngeal gill slits** throughout their life.
- **Closed type of circulatory system** is seen without heart.
- Excretion is by **protonephridia.**
- Sexes are **separate,** Fertilization is **external**.

eg. ***Branchiostoma.***

17. List the characteristic features that distinguish cartilaginous fishes with living jawless fishes.

Living jawless fishes	Cartilaginous fishes
1. These belong to **class cyclostomata** under subphylum **vertebrata,** phylum chordata	These belong to **class Chondrichthyes** under subphylum Vertebrata, phylum chordata
2. These are **jawless fishes**. 3. Mouth is **circular and suctorial**.	Mouth is located **ventrally and Jaws** are very powerful.
4. They have **true teeth**	Teeth are modified **placoid scales** which are backwardly directed.
5. They have **pouch like gills**.	They have lamelliform **gills without** operculum
Eg: Petromyzon, lamprey	**Eg:** Trygon (stingray)

18. Write short notes on number of eggs or young ones produced by an oviparous and viviparous.

Oviparous animals

- Animals which lay eggs are called **oviparous animals**.
- They **produce more number of eggs** since the eggs are exposed to environmental conditions and predators.
- They have to **pass through several developmental stages** before becoming on adult.
- They face **less chances of survival.**
- Hence they produce more number of eggs **to ensure continuation of battle**.

- Further, the eggs are released from the parent and **develop with the help of yolk stored in the egg.**
- **Parental care is not seen.**

Viviparous animals :

- Animals which **give birth to young ones** are called **viviparous animals.**
- **One or few eggs are produced** by the female since the mother has to undergo gestation period and **nurture the young ones in her womb** until they are born.
- **Reproduction cycle** requires more time.
- But the embryo is **protected from environmental conditions and predators.**
- Chances of **survival are very high.**
- Therefore the number of eggs / young ones in a **viviparous animal will be less as compared to an oviparous animal.**

19. List four features common to all chordates

1. All chordates possess a **notochord.**
2. All chordates possess a **dorsal, hollow, nerve cord.**
3. All chordates possess **pharyngeal gill** clefts in some stage of their life cycle.
4. Possess a **post-anal tail.**

20. Differentiate Polyp and Medusa

- Polyp and Medusa are two basic body forms found in **phylum cnidaria.**
- Cnidarians which exist in **both forms also exhibit alternation of generations** in their life cycle

Polyp	Medusa
1. Asexual generation	Sexual generation.
2. Cylindrical in shape.	Umbrella-shaped.
3. It is a fixed zooid.	It is a free swimming form.

21. Match the following.

1) Parenchymula - (a) Cnidaria
2) Trochophore - (b) Amphibia
3) Tornaria - (c) Annelida
4) Veliger - (d) Cyclostomata
5) Planula - (e) Mollusca
6) Tadpole - (f) porifera
7) Ammocoete - (g) Hemichordata

Ans : **1 - f, 2 - c, 3 - g, 4 - e, 5- a, 6 - b, 7 – d**

22. List out the Difference between Chordates and Non-Chordates.

Chordates	Non-chordates
1. **Notochord** is present	**Absence** of notochord
2. Dorsal, hollow and **single nerve cord**	Double ventral **solid nerve cord**
3. Pharynx perforated by **gill slits**	**Gill slits absent**
4. Heart is **ventrally placed**	Heart **is dorsal or laterally placed** or absent
5. A post anal tail is **present**	Post anal tail is **absent**

23. Write three salient features of Cephalochordates.

1. They are small fish like coelomate forms with chordate characters like **notochord, dorsal tubular nerve cord and pharyngeal gill slits** throughout their life.
2. **Closed type of circulatory system** is seen without heart.
3. Excretion is by **protonephridia**. Eg: **Amphioxus**

24. Match the following.

Column I	Column II
(P) Euplectella	i) Sea anemone
(Q) Adamsia	ii) Filarial worm
(R) Wuchereria	iii) Venus flower basket
(S) Antedom	iv) Sea-Lily

a. **(P-iii) (Q-i) (R-ii) (S-iv)** (b) (P-iv) (Q-ii) (R-iii) (S-i) (c) (P-i) (Q-ii) (R-iv) (S-iii) (d) (P-ii) (Q-i) (R-iv) (S-iii)

25. What is SACON?

- SACON stands for **SalimAli Institute for Ornithology** and Natural History and is located in Coimbatore.
- It is a National Research Institute started by **Government of India in honour of Dr. Salim Ali** -The Bird man of India.
- The aim of SACON is to **conserve biodiversity with focus on birds**

26. Mention the advantages of a true coelom.

A true coelom is formed from **splitting of mesodermal cells.**

It gives the following advantages.

1. The organs are **isolated and can function** with physiological interdependence.
2. The organs can **reposition themselves** without great distortion during movements.
3. The **peritoneum covering the organs** and lining the cavity allows lubrication.
4. **Adhesion** (fusion of tissues) is prevented.

5 Mark Questions

1. List the differences between Flatworm worms and Roundworms.

Characters	ii Flatworm	iii Round worms
Natrue	**Mosly parasitic** but some are free living	**Mostly endoparasitic** but some are free-living. Eg: Ascaris
Body	Body is **dorsoventrally flattened, triploblastic.**	Body is **bilaterally symmetrical, elongated.**
Colem	**Acoelomate** worms	**Pseudocoelomate** worms.
Excretion	Done by **flame cells.**	Excretory system consists of **Rennet glands.**
Digestive system	**Absent or incomplete.**	Alimentary canal is complete with well-developed **mouth, muscular pharynx and anus.**
Sexes	Sexes are **not separate.**	**Sexual dimorphism** is seen.

2. List the salient features of Aves. (Any 10 points)

- Aves are commonly known as **birds.**

The characteristic feature of Aves :

- They have feathers and the **ability to fly** except for flightless birds (Eg: **Ostrich, Kiwi, Penguin**).
- The **forelimbs are modified into wings,** and the hind limbs are adapted for **walking, running, swimming and resting.**
- The **skin is dry** and devoid of glands except the **oil gland or preen gland.**
- The **exoskeleton consists : epidermal feathers, scales, claws** on legs and **horny covering** on the beak.
- The **endoskeleton is fully ossified** (bony) and the **long bones are hollow with air cavities** (**pneumatic bones).**
- The **pectoral muscles of flight** are well developed. (Muscles are pectoralis major and pectoralis minor).
- Respiration is by **compact, elastic, spongy lungs** that are continuous with air sacs
- The heart is **four chambered.**
- Aves are **homeothermic.**
- **Migration and parental care** is well marked.
- **Urinary bladder** is absent.
- **Sexes are separate** with well-marked sexual dimorphism.
- In males, the **testes are paired** but in females, only the **left ovary is well developed** while the right ovary is withered.
- All birds are **oviparous.**
- Eggs are **megalecithal and, cleidoic.**
- **Fertilization is internal.** Eg: Corvus (Crow), Columba (Pigeon).

3. Write a note on Hemichordata.

1. Hemichordates were earlier treated as a **subphylum of Chordata** (or Prochordata).
2. They are now viewed to be an **independent phylum of invertebrates**, close to Echinodermata.
3. The animals of this group possess the **characters of invertebrates as well as chordates**.
4. This phylum consists of a small group of wormlike, so marine animals, mostly tubiculous and commonly called the **'acorn worms' or 'tongue worms'.**
5. They are bilaterally symmetrical, triploblastic and coelomate animals with organ system level of organisation.
6. **Body : cylindrical and is divided into three regions**,
   I. the anterior **proboscis**,
   II. a **short collar** and
   III. a **long trunk**.
7. Most they are **ciliary feeders.**
8. **Circulatory system** is **simple and open or lacune type** with a dorsal heart.
9. **Respiration** is through **paired gill slits** opening into the pharynx.
10. **Excretion** - **Single proboscis gland or glomerulus** situated in the proboscis.
11. **Nervous system** - primitive.
12. **Sexes are separate** and exhibit sexual mode of reproduction; Fertilization is **external.**
13. **Development is indirect** with a free swimming tornaria larva.

    Eg:**Balanoglossus, Saccoglossus.**

4. Compare Schizocoelom with enterocoelom.

1. **Eucoelom or true coelom** is a **fluid-filled cavity that develops** within the mesoderm and is lined by mesodermal epithelium called **peritoneum.**
2. Such animals with a true body cavity are called **eucoelomates**
3. Based on the mode of formation of coelom, the eucoelomates are classified into two types,

ii. **Schizocoelomate animals** - In these animals the **body cavity is formed by splitting of mesoderm**.

Eg: Annelids, Arthropods, Molluscs.

iii. **Enterocoelomate animals** - In these animals the **body cavity is formed from the mesodermal pouches** of archenteron.

Eg: Echinoderms, hemichordates and chordates.

4. Observe the animal below and answer the following questions.

a. **Identify the animal** - Sea Anemone

b. **What type of symmetry does this animal exhibit?** - Bilateral symmetry

c. **Is this animal Cephalized?** - No.

d. **How many germ layers does this animal have?**

Diploblastic - Two germ layers with outer ectoderm, inner endoderm and Jelly like mesoglea in between the two layers

e. **How many openings does this animal's digestive system have?**

The coelenteron or central vascular cavity which serves for digestion opens out by a single opening called mouth.

f. **Does this animal have neurons?**

g. No. Neurons are absent.

5. **Write about the special features of the phylum Porifera.**

1. These **pore bearing animals** are commonly called sponges.
2. They are **aquatic, mostly marine, asymmetrical**.
3. They are **primitive, multicellular, sessile** animals with **cellular level of organization**.
4. They are either **radially symmetrical or asymmetrical animals**.
5. They possess a **water transport system or canal system**
(water enters through minute pores called **ostia** the water enters into a **central cavity** (spongocoel) and goes out through the **osculum**.
6. This water transport system is helpful in **food gathering, circulation, respiration and removal of waste**.
7. **Choanocytes or collar cells** are special flagellated cells lining the spongocoel and the canals.
8. Nutrition is **holozoic and intracellular.**
9. All sponges are **hermaphrodites.**
10. Asexually reproduction **by fragmentation** or **gemmule formation**
11. Sexually by the **formation of gametes**.
12. **Development is indirect** with different types of larval stages (Larvae: **parenchymula and amphiblastula**) **eg. Sycon** (Scypha), **Spongilla** (fresh water sponge).

6. **Write short notes about ctenophora.**

1. Ctenophora are **exclusively marine, radially symmetrical, diploblastic animals**
2. **Organization :** Tissue level of organisation.
3. Though they are diploblastic, their **mesoglea is different** from that of cnidaria.
4. It contains **amoebocytes and smooth muscle cells**.
5. They have **eight external rows of ciliated comb plates** (comb jellies) which help in **locomotion**,
6. They are called **comb jellies or sea walnuts.**
7. **Bioluminescence** ability is well noticeable in ctenophores.

8. They possess special cells called **lasso cells or colloblasts** which help in food capture.
9. Digestion - **extracellular and intracellular**.
10. Sexes are **not separate** (monoecious).
11. They **reproduce only by sexual means.**
12. **Fertilization is external** and **development is indirect** (larval stage called cydippid larva)

Eg. Pleurobrachia and Ctenoplana.

7. List out the characters of the phylum annelida.

(i) Annelids are the **first segmented animals** to evolve.

(ii) They are **aquatic or terrestrial**, **free living** but some are parasitic.

(iii) They are **triploblastic, bilaterally symmetrical, schizocoelomates**

(iv) **Organization :** organ system level organisation.

(v) The coelom with **coelomic fluid creates a hydrostatic skeleton** and aids in locomotion.

(vi) **Body : metamerically segmented** and the body surface is divided into **segment or metameres**.

(vii) **Internally the segments are divided** from one another by partitions called **septa**. This phenomenon is known as **metamerism.**

(viii) **Nereis** have lateral appendages called **parapodia, which help in swimming.**

(ix) **Circulatory system : closed type** and the respiratory pigments are **hemoglobin and chlorocruorin.**

(x) **Nervous system :** paired ganglion connected by the lateral nerves to the **double ventral nerve cord**.

(xi) They **reproduce sexually.**

(xii) Development is **direct or indirect** (Larva : trochophore)

eg. ***Lampito mauritii*** (Earth worm).

8. Write an account on common characters of Arthropoda.

(i) This is the **largest phylum of the Kingdom Animalia**

(ii) It includes the **largest class called Insecta.**

(iii) They are **bilaterally symmetrical, segmented, triploblastic and schizocoelomate** animals

(iv) **Organization :** organ system level.

(v) They have **jointed appendages** - used for **locomotion,feeding and are sensory in function**.

(vi) Body is covered by **chitinous exoskeleton** for **protection and to prevent water loss**, It is shed o periodically by a process called **moulting or ecdysis.**

(vii) The body consists of a **head, thorax, and abdomen** with a body cavity called **haemocoel.**

(viii) **Respiratory organs :** gills, book gills, book lungs or trachea.

(ix) Circulatory system : **open type.**

(x) Sensory organs like **antennae, eyes** (compound and simple), **statocysts** (organs of balance equilibrium) are present.

(xi) **Excretion** takes place through **malpighian tubules, green glands, coxal glands**, etc.

(xii) They are mostly **dioecious and oviparous**; fertilization is internal.

(xiii) Life history includes many **larval stages followed by metamorphosis. eg.** Limulus.

9. Write the salient features of the phylum mollusca.

(i) This is the **second largest animal phylum.**

(ii) Molluscs are **terrestrial or aquatic** (marine or fresh water)

(iii) **Organization :** organ system level.

(iv) They are **bilaterally symmetrical** (except univalves), **triploblastic and coelomate animals.**

(v) **Body** is covered by a **calcareous shell**

Unsegmented with **head, muscular foot and a visceral hump** or visceral mass.

(vi) **Mantle cavity** - The space between the visceral mass and mantle (pallium) is called the **mantle cavity.**

(vii) **Feather like gills** (ctenidia) are present, which are **respiratory in function.**

(viii) The digestive system : **complete** and mouth contain **radula with transverse rows** of chitinous teeth for **feeding** (radula is absent in bivalves).

(ix) **Sense organs : tentacles, eyes and ospharidium** (test the purity of water)

(x) Excretory organs are **nephridia.**

(xi) Circulatory system : **open type except** squids, cuttle fishes and octopuses.

Blood contains haemocyanin, a copper containing respiratory pigment.

(xii) **Development is indirect** with a veliger larva.

eg. Pila (Apple snail).

10. What are the fundamental distinct features of all chordates?

All chordates possess three fundamental distinct features they are :

(i) Presence of elongated **rod like notochord below the nerve cord** and above the alimentary canal.

- It serves as a **primitive internal skeleton.**
- It may **persist throughout life** in lancelets and lampreys.
- In adult vertebrates, it may be **partially or completely** replaced by **backbone or vertebral column.**

(ii) A **dorsal hollow or tubular fluid filled nerve cord** lies above the notochord and below the dorsal body wall.

- It serves to **integrate and co-ordinate** the body functions.
- In higher chordates, the **anterior end of the nerve cord gets enlarged to form the brain** and the **posterior part becomes the spinal cord**, protected inside the vertebral column.

(iii) Presence of **pharyngeal gill slits or clefts** in all chordates at some stage of their life cycle.

- Gill slits or clefts that **perforates the walls of pharynx** and appears during the development of chordate.
- **In aquatic organisms**, pharyngeal gill slits are **vascular, lamellar and form the gills** for respiration.
- In **terrestrial organisms** - traces of **non-functional gill clefts** appear during embryonic developmental stages and disappear later.
- Chordates are **bilaterally symmetrical, triploblastic, coelomates**
- **Organization :** organ system level.
- They have post **anal tail, closed circulatory system** with a **ventral myogenic heart** except in Amphioxus.

11. Give a brief account on the characters of Tunicates.

- They are **exclusively marine** and are commonly called **sea squirts**, Mostly sessile,
- Some **pelagic or free swimming**, exist as solitary and colonial forms.
- **Body -** unsegmented and covered by a **test or tunic**.
- Adult forms are **sac like**.
- **Coelom is absent,** but has an atrial cavity surrounding the pharynx.
- **Notochord** -present only in the tail region of the larval stage, hence named **urochordata.**
- **Digestive system : complete**
- **Circulatory system - open type.**
- The heart is **ventral and tubular**.
- Respiration is through **gill slits and clefts**.
- Dorsal tubular **nerve cord is present only in the larval stage** and a single dorsal ganglion is present in the adults.
- Mostly **hermaphrodites**,
- **Development indirect** and includes a **free swimming tadpole larva** with chordate characters.
- **Declining metamorphosis** is seen.

  eg. Ascidia.

12. How are the vertebrates are further divided by divisions? Write the significance.

1. Subphylum Vertebrata is divided into two divisions, **Agnatha and Gnathostomata**.

   Agnatha

   - Agnatha includes **jawless fish-like aquatic**.
   - Vertebrates **without paired appendages**.
   - **Notochord persists** in the adult.
   - Agnatha includes class-**Cyclostomata.**

Gnathostomata

- It includes **jawed vertebrates** with paired appendages.
- Notochord is **replaced partly or wholly** by the vertebral column.
- It includes **jawed fishes** (Pisces) and **Tetrapoda** (amphibia, reptilia, aves and mammals).
- **Pisces** includes **all fishes** which are essentially aquatic forms **with paired fins for swimming and gills for respiration.**
- Pisces includes **cartilaginous fishes** (Chondrichthyes) and **bony fishes** (Osteicthyes).

13. Write the general characters of amphibians with some examples.

- Amphibians are the **first vertebrates and tetrapods** to live both in **aquatic as well as terrestrial habitats**.
- They are **poikilothermic.**
- **Body :** divided into **head and trunk** and most of them have **two pairs of limbs**;
- **Tail** may or may not be present.
- **Skin :** smooth or rough, moist, pigmented and glandular.
- **Eyes have eyelids** and the **tympanum** represents the ear.
- **Respiration** is by gills, lungs and through the skin.
- Heart is **three chambered**.
- Kidneys are **mesonephric.**
- **Sexes are separate** and fertilization is **external.**
- They are **oviparous** and development is **indirect.**
- They show **hibernation and aestivation**.

Eg. Bufo (Toad), Rana (Frog).

14. What are the general features of Reptilians?

1. They are mostly **terrestrial animals** and their body is covered by **dry, and cornified skin** with epidermal **scales or scutes.**
2. Reptiles have **three chambered heart** but four chambered in crocodiles.
3. All are **cold blooded amniotes**.
4. Most reptiles **lay cleidoic eggs** with extraembryonic membranes like **amnion, allantois, chorion** and yolk sac.
5. **Excretion** : metanephric kidneys and are uricotelic.
6. They are **monoecious.**
7. **Internal fertilization** takes place and all are **oviparous.**

   eg. Calotes (Garden Lizard),

   Draco (Flying Lizard), Crocodilus (Crocodile).

15. Write the general characters of the Class mammalia.

(i) **Unique feature**

- Their body is **covered by hair**
- **Presence of mammary glands** is the most unique feature of mammals.

(ii) Some of them are **adapted to fly or live in water.**

(iii) They have two pairs of limbs adapted for **walking, running, climbing, burrowing, swimming and flying.**

(iv) Their skin is glandular in nature, consisting of **sweat glands, scent glands and sebaceous glands.**

(v) Exoskeleton includes **horny epidermal horns, spines, scales, claws, nails, hooves** and bony dermal plates.

(vi) Teeth are **thecodont, heterodont and diphyodont.**

(vii) **External ears or pinnae** are present.

(viii) The heart is **four chambered** and possess a **left systematic arch.**

(ix) Mature RBCs are **circular, biconcave and non nucleated.**

(x) Mammals have a **large brain** when compared to other animals.

(xi) They show **greatest intelligence** among all animals.

(xii) Their kidneys are **metanephric and are ureotelic.**

(xiii) All are **homeothermic,**

(xiv) **Sexes are separate** and **fertilization is internal.**

eg. Platypus, Kangaroo, Monkey, Elephant.

16. Write five characteristic features of phylum cnidaria?

Characteristic features of phylum cnidaria:

- Cnidarians are **aquatic, sessile or free swimming, solitary** or colonial forms
- Mostly they are **radial symmetry** except for sea anemones (bilateral symmetry).
- The name Cnidaria is derived from **cnidocytes or cnidoblasts** with **stinging cells or nematocyst** on tentacles.
- Cnidoblasts are used for **anchorage, defense**, and to **capture the prey.**
- Cnidarians are the **first group of animals to exhibit tissue level** organisation
- They are **diploblastic.**
- They have a **central vascular cavity or coelenteron** (serves both digestion and circulatory function) with a single opening called **mouth or hypostome**, which serves the process of **ingestion and egestion.**

Digestion is both **extracellular and intracellular**.

- The nervous system is **primitive** and is formed of **diffused nerve net.**
- Cnidarians like corals have a **skeleton made up of calcium carbonate**.
- Cnidarians exhibit two basic body forms, polyp, and Medusa.

- The polyp forms are **sessile and cylindrical** (Eg: Hydra, Adamsia), whereas the medusa are **umbrella shaped and free swimming.**
- Cnidarians which exist in both forms, also **exhibit alternation of generations** in their life cycle
- (Metagenesis).
- The polyp represents the **asexual generation** and Medusa represents the **sexual generation**.
- **Polyps produce medusa asexually** and **medusa forms polyps sexually**
- **Development is indirect** and includes a **free swimming ciliated planula larva**.
- Eg: **Physalia** (Portugese man of war), **Adamsia** (sea anemone).