Telangana State Board of
INTERMEDIATE - FIRST YEAR

BOTANY-I

Basic Learning Material

For The
Academic Year
2021-2022

TELANGANA STATE BOARD OF INTERMEDIATE EDUCATION

BOTANY

FIRST YEAR

(English Medium)

BASIC LEARNING MATERIAL

ACADEMIC YEAR
2021-2022

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PREFACE

The ongoing Global Pandemic Covid-19 that has engulfed the entire world has changed every sphere of our life. Education, of course is not an exception. In the absence and disruption of Physical Classroom Teaching, Department of Intermediate Education Telangana has successfully engaged the students and imparted education through TV lessons. In the back drop of the unprecedented situation due to the pandemic TSBIE has reduced the burden of curriculum load by considering only 70% syllabus for class room instruction as well as for the forthcoming Intermediate Examinations. It has also increased the choice of questions in the examination pattern for the convenience of the students.

To cope up with exam fear and stress and to prepare the students for annual exams in such a short span of time , TSBIE has prepared "Basic Learning Material" that serves as a primer for the students to face the examinations confidently. It must be noted here that, the Learning Material is not comprehensive and can never substitute the Textbook. At most it gives guidance as to how the students should include the essential steps in their answers and build upon them. I wish you to utilize the Basic Learning Material after you have thoroughly gone through the Text Book so that it may enable you to reinforce the concepts that you have learnt from the Textbook and Teachers. I appreciate ERTW Team, Subject Experts, who have involved day in and out to come out with the Basic Learning Material in such a short span of time.

I would appreciate the feedback from all the stake holders for enriching the learning material and making it cent percent error free in all aspects.

The material can also be accessed through our website**www.tsbie.cgg.gov.in.**

Commissioner & Secretary
Intermediate Education, Telangana.

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Unit 1

DIVERSITY IN THE LIVING WORLD

Chapter 1: LIVING WORLD

VERY SHORT ANSWER QUESTIONS (2 MARKS)

1. What does ICBN stand for?

Ans. ICBN stand for "International code for Botanical Nomenclature".
Based on ICBN rules scientific names are given to palnts.

2. What is flora?

Ans. Actual account of Habitat, distribution and systematic listing of plants of a given area is called flora.

3. Define Metabolism. What is the difference between anabolism and catabolism?

Ans. Sum total of all the chemical reactions occuring in the body of an organism is called Metabolism.

Anabolism	*Catabolism*
(i) It is a constructive metabolic process	(i) It is a destructive metabolic process.
(ii) Complex molecules are formed from simple molecules by photosynthesis.	(ii) Complex molecules are broken down into simple molecules by respiration.

4. What is systematics?

Ans. ☞ "The study of different kinds of Organisms, their diversities and also the relationship among them" is referred to as systematics.
☞ The word systematic is derived from the latin word systema which means systematic arrangement of organisms.

5. Give the scientific name of Mango. Identify th generic name and specific epithet.

Ans. ☞ Mangifera Indica.
☞ Its generic name is "Mangifera" and specific epithet is "Indica".

6. What is growth? What is the difference between the growth in living organisms and growth in non-living objects?

Ans. ☞ Growth is a permanent and irreversible increase in the size of a living organism.
☞ In living organisms growth is from inside. Whereas in non-living objects like mountains and sand mounds growth occurs by accumulation of material on the surface.

SHORT ANSWER QUESTIONS (4 MARKS)

1. What is meant by Identification and nomenclature? How is a key helpful in the identification and classification of an organism?

Ans.
- ☞ Identification is to determine, "Whether a collected organism is entirely new or already known"
- ☞ Identification can be done by directly comparing the characters with herbarium or indirectly with the help of keys in floras.
- ☞ Nomenclature is defined as "Providing a scientific name to an identified organism".
- ☞ **Key :** Key is a taxonomical aid used for Identification of plants and animals based on the similarities and dissimilarities.
- ☞ The key are based on the contrasting characters generally in a pair called couplet.
- ☞ It represents the choice made between two opposite options.
- ☞ Each statement in the key is called lead.
- ☞ Separate taxonomic keys are required for each taxonomic category such as family, genus and species for identification purposes.
- ☞ Keys are generally analytical in nuature.

2. Explain binomial nomenclature?

Ans. Naming the plants with two words is called Binomial nomenclature. This naming system was given by carolus linnaeus. Naming is done by following some rules. They are.

1. Biological names are generally in latin and written in Italics.
2. The first word represents the genus while the second word represents the species.
3. Both the words, when hand written, are separately underlined.
4. The first word should starts with a capital letter while second word should starts with a small letter.
5. The name of the author should be at the end of scientific name in abbreviated form.

Ex : $\underset{\text{Genus}}{\underline{\text{Mangifera}}}$ $\underset{\text{Speies}}{\underline{\text{Indica}}}$ Linn

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Chapter 2: BIOLOGICAL CLASSIFICAITON

VERY SHORT ANSWER QUESTIONS (2 MARKS)

1. What is the nature of cell - walls in diatoms?

Ans. ☞ In diatoms the cell walls form two thin overlaping shells, epitheca over hypotheca which fit together as in a soapbox.
☞ The wall is made up of silica and thus the walls are not distroy.

2. How are viroids different from viruses?

Ans.

Viroids	*Viruses*
(i) Viroids contains only nucleic acid and with out a protein coat. Ex : Potato spindle tuber disease.	(i) Viruses contains both Nucleic acid and protein coat. Ex. TMV.

3. What do the terms phycobiont and mycobiant signify?

Ans. ☞ The Algal component in a lichen is called phycobiont.
☞ The fungal component in lichen is called mycobiont.

4. What to the terms 'algal bloom' and 'Red tides' signify?

Ans. **Algal bloom :** Sudden increases of algal growth which leads to water polluted and indicate potentially harmful changes in local water that is called algal blooms.
Ex : Nostoc, Anabaena.
Red tides : Red dinoflagellates like Gonyaulax undergo rapid multiplication that they make the sea appear red that is called "red tides".

5. State two economically important uses of heterotrophic bacteria.

Ans. ☞ Making curd from milk
☞ production of Antibiotics
☞ Nitrogen fixation in legume plants.

6. What is the principle underlying the use of cynobacteria in agriculture fields for crop improvement?

Ans. ☞ Cyanobacteria can fix atmospheric Nitrogen.
☞ Improve soil fertility and they show oxygenic photosynthesis.

7. Plants are autotrophic. Name Some plants which are partially heterotrophic.

Ans. ☞ Insectivorous plants. Ex : Bladderwort, venus fly trap.
☞ Parasitic plants. Ex : Cuscuta.

8. Who proposed five kingdom classification? How many kingdoms of this classification contain eukaryotes?

Ans. ☞ R.H. Whittaker
☞ Four kingdoms (Protista, fungi, plantae, Animalia) are Eukaryotes.

9. Give the main criteria used for classification by whittaker.

Ans. The main criteria for 5 kingdom classification Include cell structure, thallus organisation, mode of Nutrition, Reproduction and phylogenetic relationships.

10. Name two diseases caused by mycoplasmas.

Ans. ☞ Witches broom diseases in plants.
☞ Pleuropneumonia in cattle
☞ Mycoplasmal urethritis in Humans.

11. What are slime moulds? Explain what is meant by plasmodium with reference to slime moulds.

Ans. ☞ Slime moulds are saprophytic protists.
☞ The multinucleated mass of protoplasm is surrounded by a plasma membrane.
☞ Under suitable conditions, they form ball like an aggregation called "Plasmodium".

SHORT ANSWER QUESTIONS (4 MARKS)

1. What are the characteristic features of euglenoids?

Ans. 1. Most of the euglenoids are Fresh water organisms found in stagnant water.
2. They have a protein rich layer called pellicle makes body flexible.
3. They have two flagella, a short and a long one.
4. The anterior part of the cell bears an invagination consiting of cytostome (cell mouth), cytopharynx (gullet) and reservoir.
5. Eye spot or photosensitive stigma is present on the membrane of the reservoir.
6. They perform photosynthesis. In the absence of sunlight they behave like heterotrophs.
7. Reproduction is by longitudinal binary fission.
8. Pamella stage is found in Euglena.

2. Give the salient features and impartance of chrysophytes?

Ans. ☞ Chrysophytes includes diatoms and desmids.
☞ They are found in freshwater as well as in marine water.
☞ They are microscopic and floating organisms (plankton)
☞ Most of them are photosynthetic.
☞ In diatoms the cell walls form two thin overlapping shells, epitheca over hypotheca which fit together as in a soap box.
☞ The wall is made up of silica and thus the walls are not distroy.
☞ Over a long period of time diatoms accumulated in the sediment of oceans, that leads to diatomaceous earth is formed.
☞ They reproduce asexually by binary fission and sexually by the formation of gametes.
☞ In the sexual reproduction auxospores are formed, these are rejuvenatory spores.

Importance :

i. The diatomaceous earth is used in polishing, filtration of oils and syrups.
ii. Diatoms are the "Chief producers" in the oceans.

3. Give a brief account of Dinoflagellates.

Ans.
- ☞ Dinoflagellates are mostly marine and phytosyhthetic.
- ☞ They appear different colours based on the main pigments present in their cells.
- ☞ The cell wall has stiff cellulose plates on the outer surface.
- ☞ They have two flagella one lies longtudinally and other transversely.
- ☞ The flagella produce spinning movements. So these are called "whirling whips".
- ☞ The nucleus has condensed chromosomes even in interphase and the chromosomes do not have histones. This is called mesokaryon.
- ☞ Some dinoflagelletes like noctiluca show bioluminescence.
- ☞ Red dinoflagellates like gonyaulax undergo rapid multiplication that they make the sea appear red that is called red tides.
- ☞ In this time, toxins produced by them may kill fishes.

4. Write the role of fungi in our daily life.

Ans. Fungi in our daily life show some uses and disuses. They are.

Uses :

1. Yeast are used to make bread and beer.
2. Some fungi used as antibiotics. Ex : Pencillin.
3. Some fungi used as food. Ex: Mushrooms.
4. Fungi, act as scavengers of earth.

Disuses :

1. Spoilage of food and fruits.
2. Fungi cause diseases in plnats.
   Ex : Rust in wheat, red rot in sugar cane.
3. Fungi cause diseases in humans.
   Ex : Ringworm

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Chapter 3: SCIENCE OF PLANTS-BOTANY

VERY SHORT ANSWER QUESTIONS (2 MARKS)

1. Explain how the term Botany has emerged?

Ans. In greek language, bous refers to cattle and Bouskein to cattle feed. In course of time Bouskein gave rise to Botane which is modified to "Botany".

2. Name the books written Parasara and mention the important aspects discussed in those books.

Ans. ☞ Parasara wrote two books.
☞ "Krishi Parasaram" mentioned about agriculture and weeds.
☞ "Vrikshayurveda" gives information about 14 types of forests; the external and internal character of plants including medicinal plants.

3. Who is popularly known as father of Botany? What the book written by him?

Ans. ☞ Theophrastus.
☞ "De-historia Plantarum".

4. Who are Herbalists? What are the books written by them?

Ans. ☞ The Scientists who described the live Medicinal plants technically are called the Herbalists.
☞ The books written by them are called "Herbals".

5. What was the contribution of Corolus von linnaeus for the development of plant taxonomy?

Ans. Carolus von linnaeus popularised the Binomial nomenclature and also proposed the sexual system of classification.

6. Why is mendel considered as the father of Genetics?

Ans. Mendel conducted Hybridization experiments on pea plants and also introduced the laws of inhertance. Hence, he is considered as the father of Genetics.

7. Who discovered the cell and what was the book written by him?

Ans. ☞ "Robert Hook"
☞ "Micrographia"

8. What is palaeobotany? What is its use?

Ans. ☞ Palaeo botany deals with the study of fossil plants.
☞ It helps us in understanding the course of evolution in plants.

9. Name the branches of Botany which deal with the chlorophyllous autotrophic thallophytes and non-chlorophyllous Heterotropic thallophytes?

Ans. ☞ Algae - Phycology
☞ Fungi - Mycology

10. What are the groups of plants that live as symbionts in lichens? Name the study of lichens?

Ans. ☞ Algae and Fungi
☞ Lichenology

11. Which group of plants is called vascular cryptogams? Name the branch of Botany which deals with them?

Ans. ☞ Pteridophytes
☞ Pteridology

12. Which group of plants is called Amphibians of plant kingdom? Name the branch of Botoany which deals with them?

Ans. ☞ Broyophytes
☞ Bryology

SHORT ANSWER QUESTIONS (4 MARKS)

1. Explain in brief the scope of Botany in relation to agriculture, horticulture and medicine.

Ans. 1) Agriculture, horticulture and medicine have recorded great progress through experiments in hybridization and genetic engineering.
2) New techniques of plant breeding are useful to develop hybrid varieties in crop plants like rice, wheat, maize, sugarcane etc.
3) Recently biodiesel produced from petro plants. Ex : Jatropa, Pongamia.
4) Antibiotics are obtained from fungi. Ex : Pencillin.
5) There are many plants like Cinchona, Neem, Datura, Digitalis, Rauwolfia, Withania, Ocimum, Belladona, Aloe etc., which have medicinal values.
6) Using genetic engineering technique, cloned DNA s are produced which prepare hormones like insulin, interferon and vaccines.

2. Explain the scope of Botany taking plant physiology as example.

Ans. 1) The efforts made in plant physiology have helped the development of agriculture.
2) The role of minerals in plant nutrition is useful in usage of fertilizers and control of mineral deficiencies to improve agricultural productivity.
3) Knowledge on the role of plant hormones in plant growth and development is significant to improve agriculture and horticulture.
4) Auxins at low concentration can form roots, so it is applied in agriculture and horticulture.
5) Gibberellins induce seed germination.
6) Cytokinins are used to enhance the shelf life period of leafy vegetables like spinach, lettuce etc.

7) Abscisic acid is used for delaying the sprouting of potato tubers under storage.

8) Ethylene accelerates the ripening of fruits like apple, banana, watermelons etc.

3. What are the different branches of Botany that deal with morphology of plants? Give their salient features.

Ans. Morphology deals with the study and description of different organs of a plant. It is a fundamental essential for classification of plants. It can be divided into two parts.

a) External Morphology : It is the study and description of external characters of plant organs like root, stem, leaf, flower, fruit and seeds etc.

b) Internal Morphology : It is the study of internal structure of different plant organs. It has two branches.

i) Histology: It is the study of different tissues present in the plant body.

ii) Anatomy : It deals with the study of gross internal details of plant organs like root, stem, leaf, flower etc.

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Chapter 4: PLANT KINGDOM

VERY SHORT ANSWER QUESTIONS (2 MARKS)

1. What is the basis of classification of Algae?

Ans. ☞ Pigmentation
☞ Type of stored food.

2. When and where does reduction division take place in the life cycle of a liverwort, a moss, a fern, a gymnosperm and an angiosperm?

Ans. In liver worts reduction division occurs in capsule of sporophyte.
In mosses → Spore mother cells of sporophyte
In Ferns → Spore mother cells of sporongia
Gymnosperms → Micro sporongia and mega sporongia
Angiosperms → Microspore mother cells of anther and megaspore mother cells of ovule

3. Differentiate between syngamy and triple fusion.

Ans. **Syngamy :** One of the male gametes fuses with the egg cell to form a zygote. This is called "Syngamy".
Triple fusion : The second male gamete fuses with the diploid secondary nucleus to produce the triploid Primary endosperm Nucleus (PEN) This is called Triple fusion.

4. Differentiate between Antheridium and Archegonium.

Ans. **Antheridium :** It is the male sex organ
It produces male gametes
Archegonium: It is the female sex organ
It produces a single egg

5. What are the two stages found in the gametophyte of mosses? Mention the structure from which these two stages develop?

Ans. 1. Juvinile stage, Protonema → It develops directly from the spore.
2. Adult stage, gametophore → It develops from the protonema.

6. Name the stored food materials found in Pheophyceae and Rhodophyceae.

Ans. Pheophyceae → Laminarin / Mannitol.
Rhodophyceae → Floridian starch.

7. Name the Pigments Responsible for brown colour of phephyceae and Red colour of Rhodophyceae.

Ans. Pheophyceae → fucoxanthin pigment.
Rhodophyceae → r-phycoerthrin pigment.

8. Name different methods of vegetative Reproduction in Bryophytes?

Ans. 1) fragmentation.
2) gemmae
3) budding in secondary protonema.

9. Name the Integumented Megasporangium found in Gymnosperms. How many female gemetophytes are generally formed inside the megasporangium?

Ans. ☞ Ovule
☞ One female gametophyte

10. Name the Gymnosperms which contain Mycorrhiza and corolloid roots respectively.

Ans. ☞ Mycorrhiza - Pinus
☞ Corolloid roots - Cycas

11. Mention the ploidy of any four of the following.

a) Protonemal cell of a moss **b) Primary endosperm nucleus in a dicot**
c) Leaf cell of a moss **d) Prothallus of a fern**
e) Gemma cell in Marchantia **f) Meristem cell of monocot**
g) Ovum of a liverwort and **h) Zygote of a fern.**

Ans. a) Haploid b) Triploid c) Haploid d) Haploid
e) Haploid f) Diploid g) Haploid h) Diploid

12. Name the 4 classes of pteridophyta with one example each.

Ans. 1) Psilopsida Ex : Psilotum
2) Lycopsida Ex : Licopodium
3) Sphaenopsida Ex : Equisitum
4) Pteropsida Ex : Pteris

13. What are the first organisms to colonise rocks? Give the generic name of the moss which provides Peat?

Ans. ☞ Mosses and Lichens
☞ Species of Sphagnum.

14. Mention the fern characters found in cycas?

Ans. ☞ Circinate vernation of young leaves.
☞ Presence of Ramenta.
☞ Multiciliated male gametes
☞ Presence of Archegonia.

15. Why are Bryophytes called the Amphibians of the plant Kingdom?

Ans. Bryophytes are called Amphibians of the plant kingdom because they live in moist soil and are dependent on water for sexual reproduction.

16. Name an Algae which show

Ans. a) Haplo - diplonitc - Ex : Ectocarpus.
b) Diplontic types of life cycles. Ex : Fucus.

17. Give examples for unicellular, colonial and filamentous algae.

Ans. Unicellular algae - Chlomydomonas
Colonial algae - Volvox
Filamentous algae - Spirogyra.

SHORT ANSWER QUESTIONS (4 MARKS)

1. Differentiate between red algae and brown algae.

Ans.

Red algae	Brown algae
1. Red algae belong to the class Rhodophyceae.	1. Brown algae belong to the class phepophyceae.
2. The major plgments are chlorophyll a, d and r - phycoerythrin.	2. The major pigments are chlorophyll a, c, and fucoxanthin.
3. Red colour is due to phycoerythrin.	3. Brown colour is due to fucoxanthin pigment.
4. Food materials are stored in the form of floridean starch.	4. Food materials are stored in the form of laminarin and mannitol.
5. Cellwall is made up of cellulose, pectin and polysulphate esters.	5. Cell wall is made up of cellulose and algin.
6. Asexual reproduction is by non motile spores. Eg: Gelidium, Gracillaria.	6. Asexual reproduction is by biflagellate zoospores. Ex : Laminaria, Sargassum.

2. Differentiate between liverworts and mosses.

Ans.

Liverworts	Mosses
1. They have a thallus like dorsiventrally Flattened body.	1. These are differentiated into root, stem and leaf - like structures.
2. Sex organs are produced on the same ar on different thalli.	2. Sex organs are produced on leafy gametophore.
3. Vegetative reproduction is by fragmentation or by gemmae.	3. Vegetative reproduction is by fragmentation or by gemmae are by budding in the secondary protonema.
4. The sporophyte is small or reduced.	4. The sporophyte is more elaborate.
5. Elaters in the capsule help in spore dispersal.	5. Peristomial teeth help in spore dispersal.
6. Spores germinate to form free living gametophyte. Ex: Marchantia.	6. Spores germinate to from creeping, green, branched protonema.Ex : Funaria.

3. What is ment by homosporous and heterosporous pteridophytes? Give two examples?

Ans. **Homosporous pteridophytes :**

The plants which produce only one kind of spores are called homosporous pteridophytes. Ex : Pteris, Licopodium.

Heterosporous pteridophytes :

The plants which produce two kinds of spores, mircospores and megaspores are called heterosporous pteridophytes. Ex : Selaginella, Salvinia.

4. What is heterospory? Briefly comment on its significance. Give two examples.

Ans. The plants which produce two kinds of spores, microspores and megaspores are called heterospory.

Significance :

- ☞ In heterosporous plants, microspores develop into male gametophytes and megaspores develop into female gametophytes which leads to unisexuality.
- ☞ The male gametophyte releases the male gametes and these reach the female gametophyte to fuse with the egg.
- ☞ The female gametophytes retain on the parent sporophyte for variable period.
- ☞ The devolopment of zygotes into young embryos takes place within the female gametophytes. This event is a precursor to the seed habit.
- ☞ It is considered as an important step in evolution.
  Ex. Selaginella and salvinia.

5. Write the Economic imporatance of Algae and Bryophytes.

Ans. **Economic importance of Alagae :**

- ☞ At least a half of the total CO_2 fixation on earth is carried out by Algae through photosynthesis
- ☞ Algae increases the level of O_2 in the environement.
- ☞ Algae are primary producers for all aquatic animals.
- ☞ Many species of porphyra, laminaria and sargassum are used as food.
- ☞ Brown algae and Red algae produce large amounts of Hydrocolloids, which are used commercially. Ex: algin and carrageen.
- ☞ Red algae produce agar which is used to grow microbes and in perparations of Ice-creams and Jellis.
- ☞ Brown algae produce Iodine.
- ☞ Chlorella and spirulina are used as food supplements by space traveller.

Economic Importance of Bryophytes :

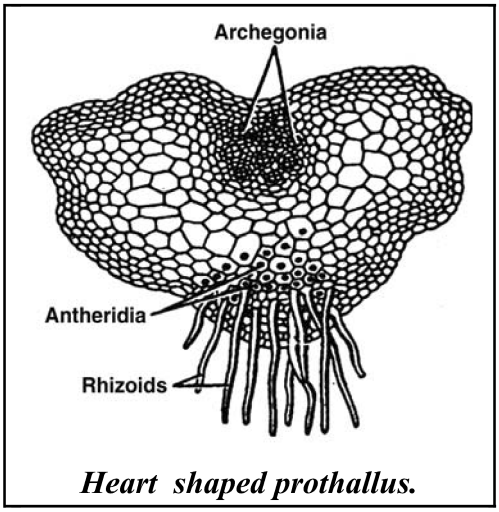
- ☞ Mosses provide food for herbaceous mammals, birds and other animals.
- ☞ Sphagnum, a mass provides peat used as fuel.
- ☞ Mosses used in the transportation of living material because of Its capacity to hold water as packing material.
- ☞ Mosses along with lichens are the first organisms to colonise rocks.
- ☞ They induce the growth of plants on rocks.
- ☞ Mosses form dense mats on the soil thus, they prevents soil erosion.

6. Give a brief account of prothallus.

Ans. In pteridophytes, the spores germinate to give rise thallus like gametophyte is called prothallus.

- ☞ Prothallus is small, multicellular free living, mostly, photosynthetic.

- ☞ They require cool, damp, shady places to grow.
- ☞ Because of this specific requirement and water for fertilization, the spread of living pteridophytes is limited and restricted to narrow Geographical regions.
- ☞ The gametophytes bear male and female sex organs called antheridia and archegonia.
- ☞ The sex organs are multicellular, jacketed and sessile.
- ☞ Prothallus is heart shapped.
- ☞ Rhizoids arise from the lower surface of the prothallus. They absorb water and minerals from the soil.



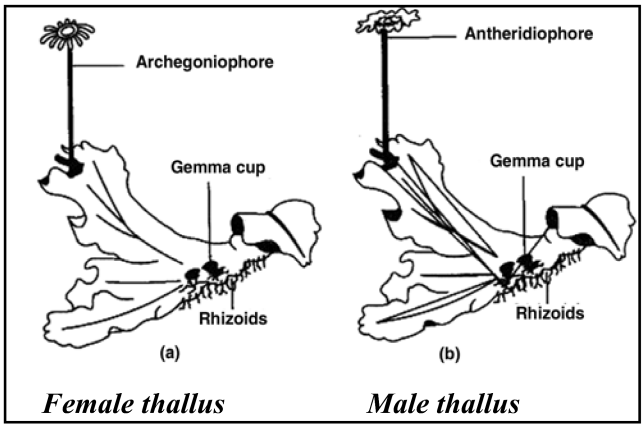
Heart shaped prothallus.

7. Draw labelled diagrams of ?

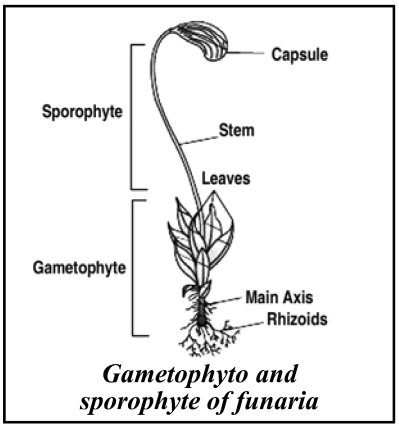
(a) Female thallus and male thallus of a liverwort.

(b) Gametophyte and sporophyte of funaria

Ans:



Female thallus *Male thallus*



Gametophyto and sporophyte of funaria

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Unit 2

STRUCTURAL ORGANISATION IN PLANTS-MORPHOLOGY

Chapter 5: MORPHOLOGY OF FLOWERING PLANTS

VERY SHORT ANSWER QUESTIONS (2 MARKS)

1. Differentiate between Recemose and cymose Inflorescences?

A. * In racemose type of infloresences, the main axis continues to grow and the flowers are borne laterally in an acropetal order.

* In cymose type of inflorescences, the main axis terminates into a flower, hence it shows limited growth. The flowers are born in a basipetal order.

2. What is morphology of cup like structure in cyathium ? In which family it is found?

A. * Involucre of bracts.

* Euphorbiaceae.

3. What type of infloresence is found in fig trees? Why does the insect Blastophaga visits the inflorescence of fig tree?

A. * Hypanthodium

* Blastophaga lays its eggs in the gall flowers of fig tree

4. Differentiate actinomorphic from zygomorphic flower ?

A. * **Actinomorphic flower:** A flower that can be cut into two equal halves in any vertical plane.

Ex: Datura.

* **Zygomorphic flower:** A flower that can be cut into two equal halves in only one verticle plane. Ex:Pea.

5. How do the petals in pea plant are arranged ? What is such type of arrangement called ?

A. * In pea and bean flowers, there are 5 petals, the largest (standard) overlaps the two lateral petals (wings) which in turn overlap the two samllest Anterior petals (keel). This type of aestivation is known - as “vexillary or papilionaceous”.

6. What is meant by epipetalous condition ? Give an example ?

A. * Stamens are attached to the petals. Ex:(Brinjal) Solanum.

7. Differentiate between Apocarpous and syncarpous ovary?

A. * Apocarpous - Gynaecium with seperate or free carpels. Ex:-Annona
* Syncarpous - Gynaecium with united or fused carpels.Ex:Datura.

8. Define placentation. What type of placentations is found in Dianthus ?

A. * The arrangement of ovules in the ovary in knows as placentation.
* Free central placentation is found in Dianthus .

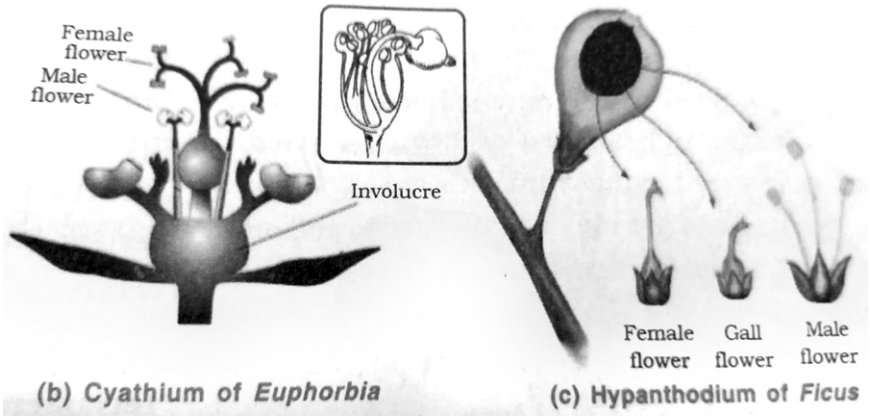
SHORT ANSWER QUESTIONS (4 MARKS)

1. Describe any two special types of inflorescences

A. **Cyathium:**

Ex: Euphorbia (Euphorbiaceae).

* This special type of inflorescence cantains all the unisexual, achlamydeous bracteate flowers.
* All the bracts of the flowers forms a cup like structure.
* In side the cup, at the centre only one tricarpellary female flower is present.
* no. of male flowers are preasent arround the female flower in scorpioid manner.
* Male flowers are represented by a single stamen.



Hypanthodium:

Ex :Ficus (fig)

* Inflorescence axix is fleshy and cup shaped.
* Inner surface of cup contain no of unisexual flowers and gall flowers (Neutral flowers)
* male flowers are present at the top (nearer to opening of cup) ‘ female flowers at the bottom and gall flowers between these two types of flowers.

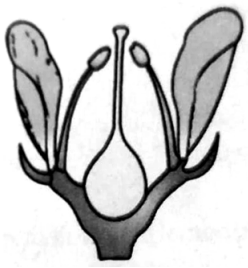
2. Describe the arrangement of floral members in relation to their insertion on thalamus.

A. **Hypogynous flowers:**

* In this thalamus in flat or discoid on which gynoecium is present.
* Remaining all floral parts arise / present below the ovary.
* Position of ovary is superior.

Ex:Solanum, Brassica (Mustard) Hibiscus (China-rose)


(a) Hypogynous


(b) Perigynous


(c) Epigynous

Perigynous flowers:

* In this thalamus is cup shaped . At the centre of cup gynoecium in present.
* The rim of thalamus contains the remaining floral parts.
* Position of ovary is half superior or half - interior.

Ex:Plum, peach, Rose etc..,

Epigynous flowers:

* In this the margin of thalamus grows upward enclosing the ovary completely and getting fused with it. While other parts of the flower arise above the ovary. The ovary is said to be inferior.

Ex: Guava , Cucumber and the ray florets of sunflower.

3. The flowers of many angiospermic plants which show sepals and petals, differ with respect to the arrangment of sepals and petals in respective whorls Explain.

A. * The mode of arrangement of sepals or petals in floral bud is known as aestivation. The main types of aestivation are valvate, twisted, imbricate and vexillary.

Valvate:

* Sepal or petals in a whorl just touch one another at the margin without overlapping.

Ex:- Calotropis.

Twisted:

* If one margin of the appendage overlaps that of the next one and so on .

Ex; China Rose, Lady's finger, Cotton

Imbricate:

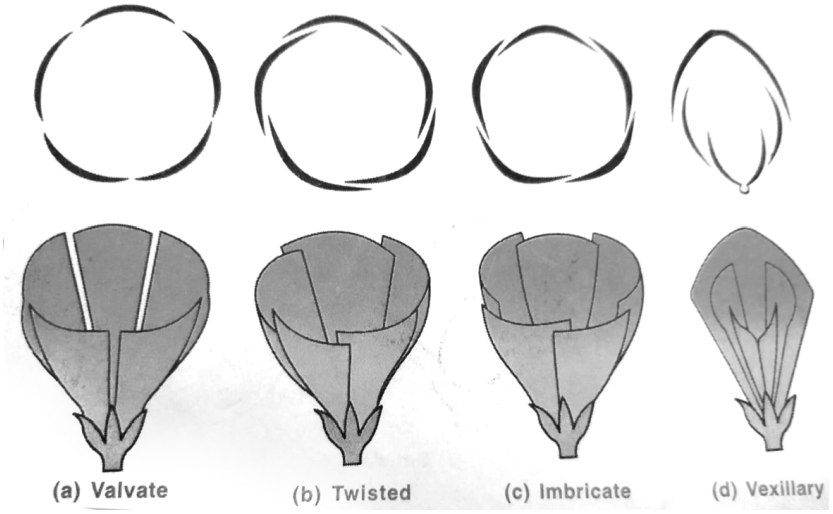
* The margins of sepals or petals overlap one another but not in any particular direction.

Ex:-Cassia and Gulmohur.

Vexillary or Papilionaceous:

* In this five petals are presents. The largest petal (standard) ovrlaps the lateral petals (wings) which in trun overlap the two smallest anteritor petals (keel)

Ex: Pea, Bean



4. Describe any four types of placentations found in flowering plants.

A. * The mode of arrangement of ovules in the ovary is called placentation.

* It is of different types.

i) Marginal placentation:

In this type, the ovules are arranged along the ventral sutures of a carpel.

Ex:- Pisum (pea)

ii) Parietal Placentation:

In this type, the ovules are arranged on the inner wall of the ovary or an peripheral part.

Ex:- Argemone, Brassica (Mustard)

iii) Axile Placentation:

At the centre of the ovary there occurs a placental axis on which ovules are arranged.

Central placental axis and ovary walls is connected with septa, hence ovary becames bilocular to multilocular (depending on the no. of septa).

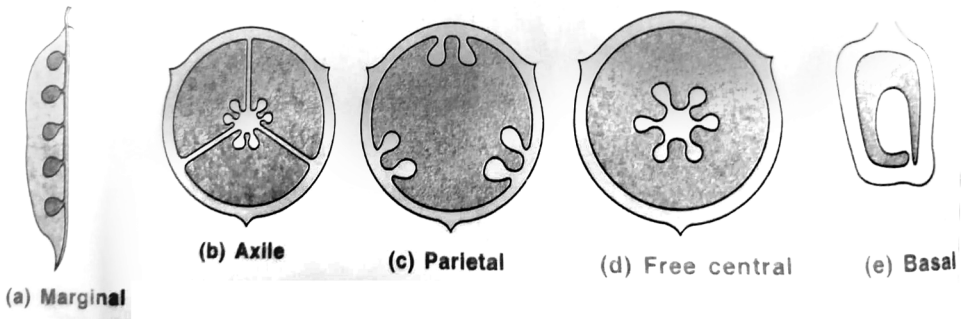
Ex: Hibiscus (China Rose), Citrus (lemon)

iv) Free - Central Placentation:

At the centre of ovary a single placental axis is present, on which ovules develop.

* Ovary wall and placental axis not connected b y septa.
* Hence ovary is always unilocular.

Ex:- Dianthus ; Primrose



v) Basal Placentation:

Placental tissue develops at the base of the ovary, and a single ovule is attached to it .

Ex:- Sunflower, Marigold.

LONG ANSWER QUESTIONS (8 MARKS)

1. Explain different types of racemose inflorescence?

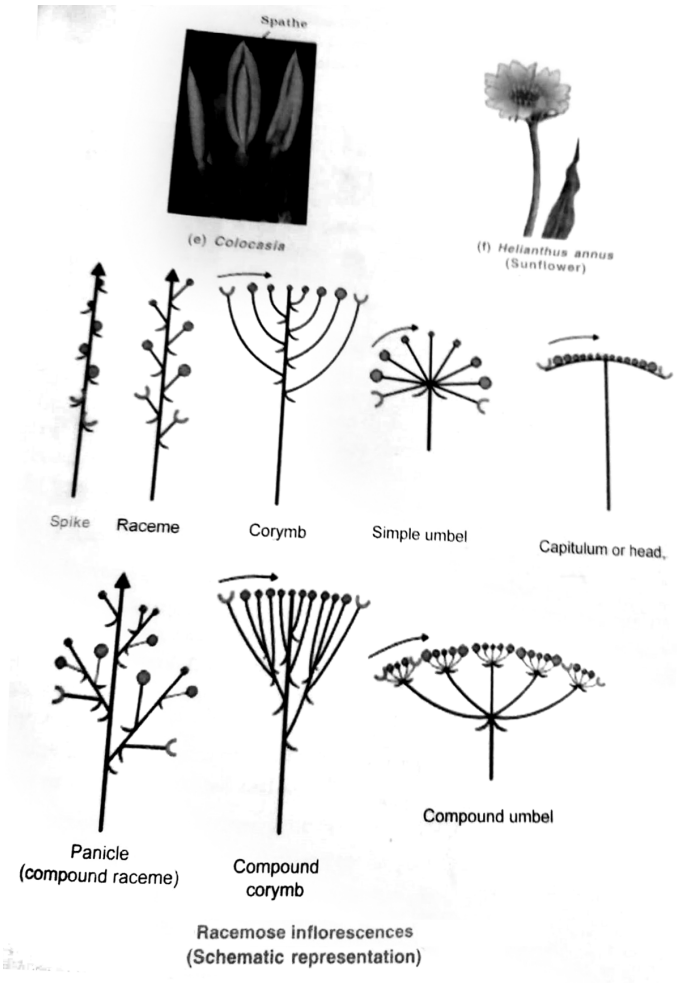
A. * The arrangement of flowers on the floral axis is termed as infloresence.

* In racemose type of inflorescence, the main axis continues to grow and the flowers are born laterally in an acropetal succession on the main peduncle (called simple inflore scence) or on it's branches (called compound infloresence) which also arise in acropetal succession.

* There are several sub-types in the racemose category.

1.Raceme	2.Corymb	3.Umbel
4.Spike	5.Spadix	6.Head inflore scence.

1. **Raceme:** The peduncle is simple, branched (or) umbranched, producing many pedicillate flowers in acropetal succession. Ex.Crotaloria, Mangifera.
2. **Corymb:** In corymb, all the flowers are brought to the same hight due to varied length of the pedicels even through they are born at different nodes. Ex. Cassia, cauliflower.
3. **Umbel:** In onion and carrot, the flowers appear to have arisen from the same point of the pedumcle and such inflorescence is called umbeltype. It is covered by a whorl of bracts called involucre.
4. **Spike:** Acropetal arrangement of sessile flowers on the peduncle, is called spike.
   Ex:Achyranthus and grasses.
5. **Spadix:** Sessile unisexual and neuter flowers arranged in actopetal succession protected by modified bract called "spathe" such inflorescence is called "spadix"
   Ex:Musa and colocasia
6. **Head inflorescence:** Penduncular axis is condensed. Unisexual and bisexual sesile flowers develop centripetally on this condensed peducnle. Such on arrangement of flowers is called head inflorescence.
   Ex: Tridax and sunflower.



Unit 3

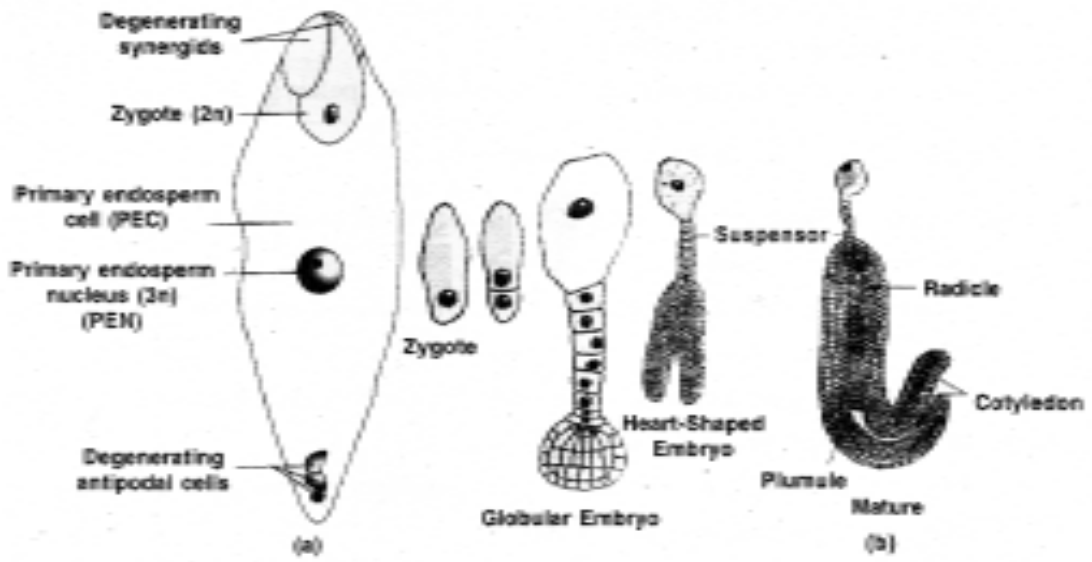
REPRODUCTIO IN PLANTS

Chapter 7: SEXUAL REPRODUCTION IN FLOWERING PLANTS

LONG ANSWER QUESTIONS

1. Starting with the zygote, draw the diagrams of the different stages of embryo

A.



a) Fertilised embry sac shwoign zygote and primary Endosperm Nucleus (PEN)

b) Stages in embryo development in a dicot

2. What are the possible types of pollinations in chasmogamous flowers? Give reasons

A. Chasmogamy: The pollination that occurs in opened flowers is called Chasmogamy. This of two types. 1. Self pollimation 2. Cross pollimation.

1. **Self Pollination or Autogamy:** Transfer of pollen grains from the anther to stigma of same flower is called self pollination. If the anthers and stigma of chasmogamous flower mature at the same time, self pollination occurs.

   Cleistogamy is a type of pollination that occurs in closed flowers. Cleistogamous

flowers never open. Anthers dehisce in the flower buds, pollen grains come in contact with the stigma to effect self pollination. Thus only self pollination is possible in cleistogamous flowers.

2. **Cross pollination or Allogamy:** Transfer of pollen grains from the anther to stigma of another flower is called cross pollination. It is of two types.

   i. **Geitonogamy:** Transfer of pollen grains from the anther to stigma of another flower of the same plant is called geitonogamy. Genetically it is similar to autogamy, since the pollen grain come from the same plant. Ex: Cocos.

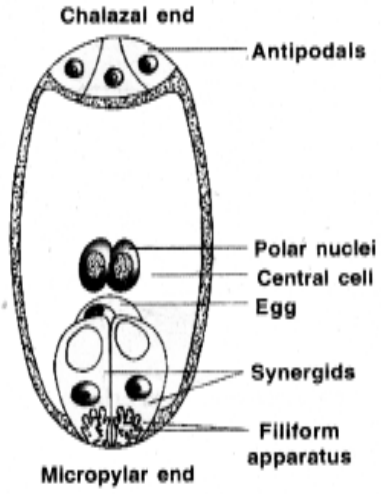
   ii. **Xenogamy:** Transfer of pollen grains from the anther to stigma of another flower of another plant is called xenogamy. This is the only type of pollination which brings genetically different types o fpollen grains to the stigma. **Ex:** Borassus.

   If the plants are continued to perform self pollination, it leads to inbreeding depression. So several plants developed contrivancies of cross pollination and achieved genetic divergence.

3. With a neat, labelled diagram, describe the parts of a mature angiosperm embryo sac, Mention the role of synergids.

A. The mature angiosperm embryosac is 7-celled and 8-nucleated. It shows three parts.

1. Egg apparatus 2. Central cell 3. Antipodals.



Diagrammatic representation of the mature embryo sac

1. Egg apparatus:

i) Three cells grouped together at the micropylar end constitute the egg apparatus.

ii) They are two synergids and one egg cell.

iii) The synergids with special cellular thickenings at the micropylar tip is called filiform apparatus.

iv) The middle largest cell is called egg or oospore.

2. Central cell:

i) It is the largest cell of embryosac.

ii) It has two polar nuclei which fuse to form a single diploid secondary nucleus.

3. Antipodals:

i) Three cells present at the chalazal end of embryosac are called antipodals.

ii) These are smallest cells of embryosac.

iii) They desgenerate before or after fertilisation.

iv) They are considered as vegetative cells of embryosac.

Role of Synergids:

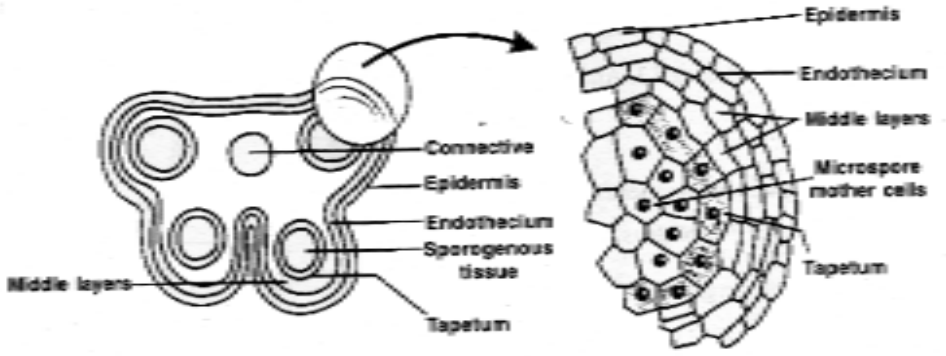
i) Synergids, nourish female gametophyte nutrients from surrounding nucellus.

ii) They help in the absorption of nutriends from the nucellus into the embryosac.

iii) They play an important role in guiding the pollen tube into Egg cell.

4. Draw the diagram of a microsporangium and label its well layers. Write briefly about the wall layers.

A.



a) Thransverse section of another microsporangium **b) Enlarged view of Microsporangium**

Wall layers of Microsporangium are of 4 types:

They are 1. Epidermis 2. Endothecium 3. Middle layers 4. Tapetum

1. **Epidermis:** The outer, thick, protective layer of microsporangium is called epidermis. The cells presnt between the two pollen sacs are thin walled and this region is called as stomium. This is useful for the dehiscence of pollen sacs.
2. **Endothecium:** It is below the epidermis and expands radially with fibrous thickenings. At maturity, these cells lose water and contract. They help in the dehiscence of pollen sacs.
3. **Middle layers:** Below the endothecium, 1 to 5 layers of thin walled cells form the middle layes. They help in the dehiscence of anther.
4. **Tapetum:** The inner most wall layer is the tapetum. It encircles the sporogenous tissue. The cells in this layer are large, thin walled & multinucleate. It nourishes the development of pollen grains.

5. Describe the process of Fertilization in angiosperms.

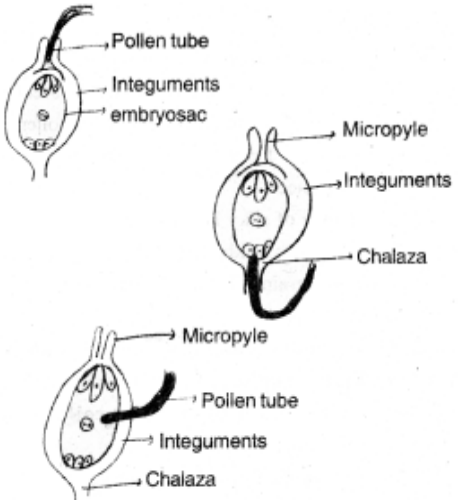
A. Fertilization in angiosperms: The fusion of male and female gemetes is called Fertilization. The process of fertilization in angiosperms consists of five steps.

1. **Entry of the pollen tube into ovule:** The pollen tube enters they ovule by any one of 3 ways.

   a. Porogamy: Entry of the pollen tube through micropyle is Porogamy. Ex. Hibiscus

b. Chalazogamy: Entry of the pollen tube through Chalaza is Chalazogamy. Ex. Casuarina

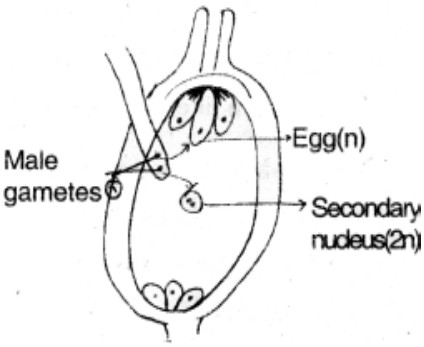
c. Mesogamy: Entry of the pollen tube through integuments is Mesogamy Ex. Cucurbita.



2. **Entry of pollen tube into embryo sac:** During the entry of the pollen tube into the embryo sac, the filiform apparatus of synergids guide the pollen tube.

3. **Discharge of male gametes into Embryosac:** The pollen tube always enters the embryosac at the micropylar end of embryosac. After entering one of the synergids, the pollentube bursts and releases two male gametes into the cytoplasm of the synergids.

4. **Syngamy:** One of the male gametes fuses with the egg cell, resulting in the formation of diploid zygote. This is called syngamy or true fertilisation.



5. **Triple fusion and double fertilisation:** The second male gamete fuses with the diploid secondary nucleus and results in the formation of a triploid Primary Endosperm Nucleus (PEN). This phenomenon is also known as double fertilisation. As this process involves the fusion of one nuclei of 'haploid male gamete' and two polar nuclei, this fusion is also known as triple fusion.

6. Write a brief account on agents of pollination.

A. Pollination in plants occurs by two abiotic (wind and water) and one biotic (animals) agents.

1. **Wind pollination:** The pollination by wind is called Anemophily. Wind polinated flowers produce large amount of pollen, the pollengrains are light and non sticky.

   The flowers possess well exposed stamens, so that the pollen is easily dispersed into wind current. Large feathery stigmas are presnt to trap the pollen easily. Numerous flowers are packed into an inflorescence.

   The bunch of silky hairs of corn cob are nothing but the stigmas and styles which hang in air to trap the pollengrains. Wind pollination is common in grasses.

2. **Water pollination:** Pollination by water is called Hydrophily. It is of two types.

   a) Epihydrophily: Pollination at the surface level of water is called epihydrophily.

Ex: Vallisneria.

The female flowers reach the surface of water by its long stalk and the male flowers are released on the surface of water.

They are carried by water current to reach the female flowers and the stigma to perform pollination.

b) Hypohydrophily: Pollination below the surface level of water is called hypohydrophily. Plants like zostera and their flowers remain submerged in water. Pollen grains are long, ribbon like and are carried inside the water and reach the stigma to achieve pollination.

3. **Zoophily:** Pollination by the agency of animals is called zoophily. These flower may be with attractive colours, or they may produce nectar or fragrancy, pollengrains and may be sticky.

a. Pollination by **insects** is called **entamophily**.

b. Pollination by **birds** is called **ornithophily**.

c. Pollination by **bats** is called **chiropteriphily.**

d. Pollination by **squirrels** is called **therophily**.

e. Pollination by **snakes** is called **ophiophily.**

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Unit **4**

PLANT SYSTEMATICS

Chapter 8: TAXONOMY OF ANGIOSPERMS

VERY SHORT ANSWER QUESTIONS (2 MARKS)

1. What is 'Omega Taxonomy'?

A. * Ta xonomy based on information from other branches such as Embryology, Cytology, Palynology, Phytochemistry etc., in addition to Morphological characters is called "Omega Taxonomy".

2. What is Natural system of plant classification? Name the scientists Who followed it?

A. * The system of classification in which plants are grouped on the basis of their Natural relationships taking into consideration all possible morphological characters is known as natural system of classification.

* Bentham and Hooker

3. Explain the scope and signaficance of "Numerical taxonomy"?

A. * Numerical taxonomy uses Mathematical methods to evoluate observable differences and similarities between taxonomic groups.

* Numerical taxonomy which is now easily carried out using the computers is based on all observable characterestics.

4. Write the floral formula of solanum plant ?

A. * Br, Ebrl, ⊕, ⚥, $K_{(5)}$, $\overset{\frown}{C_{(5)}, A_{(5)}}$, $\underline{G}_{(2)}$

5. Give the technical description Ovary of Solanum nigrum?

A. * The ovary is bicarpellary, syncarpous bilocular superior. Placenta swollen with many ovules on axile placentation. Style terminal stigma capitate.

* Carpels are arranged obliquely at 45^0 .

6. Give the technical description of anthers of Allium cepa?

A. * Anthers are dithecous, basifixed, introrse and dehiscence is longitudinal.

SHORT ANSWER QUESTIONS (4 MARKS)

1. Write a brief note on semi technical description of a typical flowering plant?

A. * Technical description of a typical flowering plant begings with its habitat,habit, vegetative characters and floral characters followed by type of fruit.

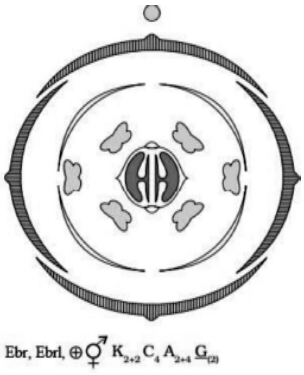
After describing various parts of a plants, a floral diagram and a floral formula are presented. The floral formula is represented by some symbols of floral parts.

The symbols of floral formula are as follows :

Br	-	Bracteate	P	-	Perianth
Ebr	-	Ebracterate	A	-	Androecium
Brl	-	Bracteolate	G	-	Gynoecium
Ebrl	-	Ebracteolate	( )	-	Cohesion of floral parts in a whorl
			CA	-	Epipetalous stamens
$\oplus$	-	Actinomorphic	$\underline{G}$	-	Superior ovary
%	-	Zygomorphic			
$\male$	-	Male flower	$\overline{G}$	-	Inferior ovary
$\female$	-	Female flower			
$\male\!\!\female$	-	Bisexual flower	G	-	Half inferior ovary
K	-	Calyx			
C	-	Corolla			

* Floral formula indicates the number of free or united members of corresponding whorl as subscript of the respective symbols. It also shows cohesion and adhesion.
* Floral diagram provides information about the no of parts of a flower, their arrangement and the relation they have with one another.
* The mother axis represents the posterior side of the flower and is indicated as a dot or a circle at the top of the floral diagram.
* Successive whorl represent calyx, corolla androecium and gynoecium.
* Calyx is the outermost whorl.
* Gynoecium at the centre and represented by TS. of ovary.
* The bract represents the anterior side of the flower and is indicated at the bottom of the floral diagram.

2. Give an account of floral diagram.



A. * Floral diagram provides information about the no of parts of a flower, their arrangement and the relation they have with one another.
* The mother axis represents the posterior side of the flower and is indicated as a dot or a circle at the top of the floral diagram.
* Successive whorl represent calyx, corolla androecium and gynoecium.
* Calyx is the outermost whorl.
* Gynoecium at the centre and represented by T S. of ovary.
* The bract represents the anterior side of the flower and is indicated at the bottom of the floral diagram.

3. Describe the essential floral parts of plants belonging to Liliaceae?

A. *Androecuim and Gynoecium are the essential floral parts of a flower.

***Androecuim:**

Stamens are six, arranged in two whorls of three each.

* They are free or epiphyllous.
* Anthers are dithecous, basifixed, introrse and dehiscence is longitudinal.

Gynoecium:

Ovary is tricarpellary, syncarpous superior, trilocular with numerous ovules on axile placentation.

* The style is terminal and stigna is trified and capitate.

4. Wrirte a brief account on the class of Dicotyledonae of Bentham and Hooker's classification.

A. * The class Dicotyledonae are characterised by tap root system ,reticulate venation, tetramerous or pentamerous flowers and two cotyledons in a seed.

* On the basis of the number of whorls in the Perianth and the condition of petals, the dicotyledons are divided into three sub-classes namely Polypetalae, Gamopetalae and Monochlamydae
* Polypetalae was divided into three series namely.
  1.Thalamiflorae (Containts 6 cohorts)
  2. Disciflorae (Containts 4 cohorts)
  3. Calyciflorae (Containts 5 cohorts)
* Gamopetalae was divided into three series viz.
  1.Inferae (Containts 3 cohorts)
  2.Heteromerae and (Containts 3 cohorts)
  3.Bicarpellatae (Containts 4 cohorts)
* Monochlamydae was divided into eight series. (not divided into cohorts)

Cohorts are further divided into natural orders (now called as families).

Dicotyledonae contains totally 165 naturals orders / families (Acc. to B & H classification.)

5. Decribe the essential organs of solanaceae ?

A. **Androecium:**

*Stamens are 5, epipetalous, alternating with the petals.

*Anthers dithecous, basifixed, introrse.

Gynoecium:

It Consists of bicarpellary, syncarpous bilocular (rarely unilocular) superior ovary ,with swollen axile placentation. Style terminal stigma capitate.

* Carpels of ovary are arranged obliquely at 45^0 .

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Unit 5

CELL: STRUCTURE AND FUNCTIONS

Chapter 9: CELL: THE UNIT OF LIFE

VERY SHORT ANSWER QUESTIONS (2 MARKS)

1. What is the significance of vacuole in a plant cell?

Ans. ★ In plant cell, vacuole plays an Important role in Osmoregulation.

★ Vacuolar sap also contains pigments like Anthocyanin which produce colour to plant parts like flower.

2. What does 's' refer in a 70 's' and 80's ribosome?

Ans. ★ 'S' stands for the sendimentation co-efficient (expressed in svedberg unit).

★ It is indirectly a measure of density and size.

3. Mention a single membrane bound organelle which is rich in hydrolytic enzymes?

Ans. Lysosomes

4. What are gas vacuoles? State thier functions?

Ans. ★ Gas vacuoles are inclusion bodies in cytoplasm.

★ They store food meterials in prokaryotic cells.

★ They help the bacteria to float on the surface of the water.

5. What is the function of polysome?

Ans. ★ During protein synthesis several ribosomes form into long chains called polysomes.

★ They translate the mRNA into proteins.

6. What is the feature of a metacentric chromosome?

Ans. The metacentric chromosome has middle centromere forming two equal arms of the chromosome.

7. What is refered to as satellite chromosome?

Ans. A round terminal part of the chromosome present beyond the secondary constriction in some chromosomes is called satellite chromsome.

8. What are Micro bodies? What do they contain?

Ans. ★ Peroxysome & Glyoxysome.

★ Peroxysomes are involved in photorespiration and protect the cells from H_2O_2.

★ Glyoxysomes contain the enzymes of glyoxylate cycle which convert lipids to carbo hydrates.

9. What is middle lamella made of? What is it's functional significance?

Ans. Middle lamella is mainly composed of calcium pectate and holds the different neighbouring cells together.

10. What is Osmosis?

Ans. Movement of water from low concentrated place to high concentrated place through semi permeable membrane is called osmosis.

11. Which part of the Bacterial cell is targeted in gram staining?

Ans. Chemical composition of cell envelope.

SHORT ANSWER TYPE QUESTIONS

1. Describe the cell organell which contains chlorophyll pigments.

Ans. 1. The cellorganelle which contain chlorophyll pigment is called chloroplast. It is also known as Kitchen House of the Cell

2. Majority of the chloroplasts of the green plants are found in the mesophyll cell of the leaves.

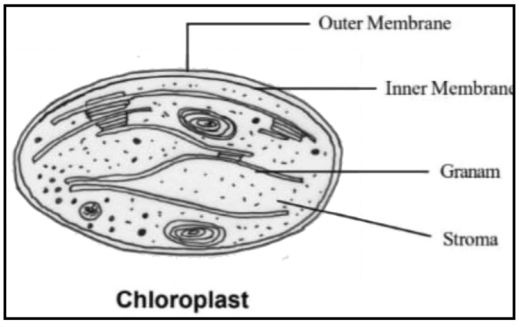
3. These are lens shaped, oval, spherical, discoid (or) ribben like organelle.

4. Each chloroplast is surrounded by an envelop which is made up of two unit membranes that are separated by a "periplastidial place". The inner space of chloroplast is filled with a colourless matrix called stroma

5. A number of organised flattened membraneous sac called the "thylakoids". These are present in the stroma.

6. Stroma many thylokoids, enzymes involves in the synthesis of carbohydrates, proteins, 70s ribosome, small ds-circular DNA molecules etc., are present.

7. The membrane of the thylokoids enclose a space called a lumen.



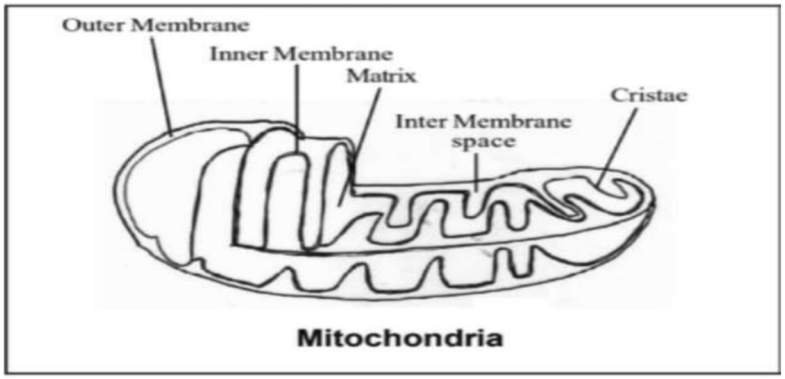
Chloroplast

8. Photosynthetic pigments photosystem-I and Photosystem-II and electron transport system are present in the thylokoids.

2. Describe the structure and function of power house of the cell.

A. 1. The power house of the cell nothing but Mitochondria.

2. Mitochondira are present only in Eukaryotic cells.



3. Mitochondria are typical sausage - shaped or cylindrical cell organelle.
4. It is a double membrane bound structure with an outer membrane and the inner mem brane dividing its lumen distictly into two compartments. The inner compartment is called "Matrix".
5. The inner membrane forms a number of foldings called "Cristae".
6. The matrix containing single circular DNA, a few RNA, 70 S ribosomes and other components required for synthesis of proteins.
7. The outer membrane forms the continuos limiting boundary of the organell.
8. The two membranes have their own specific enzymes associated with the mitochon dria function.

Functions of Mitochondria:

i) Mitochondria are the sites of aerobic respiration and generate cellular energy into the form of adenosine triphosphate (ATP), hence they are called power house of the cell.

ii) Cristae are the sites of oxidative phosphorylation and electron transport matrix is the site of krebs cycle.

3. Comment an the cartwheel structure of centriole.

A. 1. Centrosome is an organelle usually containing two cylindrical structure called "Centrioles

2. Both the centrioles in a centrosome lie perpendicular to each other in which each has an organisation like the cartwhel.
3. Each centriole is made with nine evenly spaced peripheral fibrils of tubulin.
4. Each of the peripheral fibril is a triplet. The adjacent triplets are also linked.

5. The central part of the centriole is proteinaceous and called "hub"
6. Centrioles form the basal body of cilia or flagella and spindle fibres that give rise to spindle apparatus during cell division in animal cells.

4. Briefly describe the cell theory.

A. 1. Schleiden and Schwann together formulated the cell theory.
2. In 1838 Schleiden, a German Botanist examined a large number of plants and observed that all plants are composed of different kinds of cells which forms the tissues of the plant.
3. Schwan in 1839 a British Zoologist studied different types of animal cell and reported that cells had a thin outer layer called "plasma membrane"
4. He also concluded that plant cell have a characteristic cell wall that differentiates from animal cell.
5. Schleiden and schwann together formulated the cell theory. This theory however did not explain as to how new cells were formed.
6. In 1855 Rudolf Virchow first explained that cells divided and new cells are formed from pre-exsting cells is called “Omnis Cellula - e cellula” on the basis of above points both Schleidon and Schwann together formulated cell theory.

Cell theory states that

i) All living organisms are composed of cells and their products of cells.
ii) New cells arise from pre-existing cells.

5. Differentiated between Rough Endoplasmic Reticulum (RER) and Smooth Endoplasmic Reticulum (SER).

A.

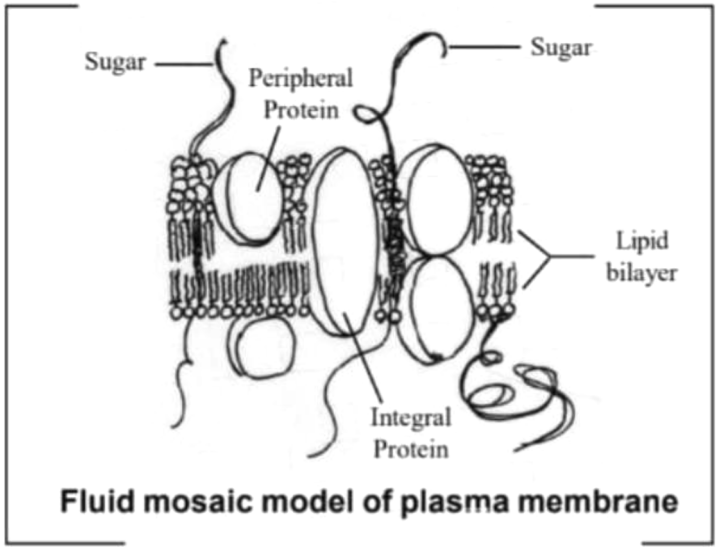
Rough Endoplasmic Reticulum (RER)	Smooth Endoplasmic Reticulum (SER)
1. Rough Endoplasmic Reticulum attached with ribosomes.	1. Smooth Endoplasmic Reticulum is not associated with ribosomes.
2. These are mainly composed of cisternae.	2. These are mainly composed of tubules.
3. Generally associated with nuclear memberane.	3. Generally associated with plasma memberane.
4. Main function is protein synthesis.	4. Main function is lipid synthesis.
5. RER synthesis golgi bodies.	5. SER not involved in synthesis of golgi bodies.
6. RER not concern with glycogen storage	6. SER concern with glycogen storage.

6. Give the biochemical composition of plasma membrane. How are lipid molecules? arranged in the membrane.

A. **Plasma Membrane:** The living membrane surrounding the protoplasm is called plasma membrane.

Chemical structure of plasma membrane:

1. The cell membrane is composed of lipids that are arranged in a bilayers.
2. The lipid component of the membrane mainly consist of "phosphoglycerides".
3. Biochemical investigations clearly revealed that the cell membrane posses protein and carbohydrates.
4. Protein can be classified in to integral or peripheral depending on their location and easy of extractions.
5. Peripheral proteins lie an the surface of membrane while the integral proteins are partially or totally buried in the membrane.
6. The lipids are arranged within the membrane with polar (hydrophilic) head towards the outer side the non polar (hydrophobic) tails towards the inner part, which ensure that the non polar saturated hydrocarbons is protected form the aquesous environment.



Fluid mosaic model of plasma membrane

7. Singer and Nicolson (1972) proposed fluid mosaic model for the structure of cell membrane.
8. According to this model, the quasi-fluid nature of lipid enables lateral movement of protein within the overall bilayer, this ability to move with in the membrane is understood as fluidity.

7. Describe the structure of nucleus.

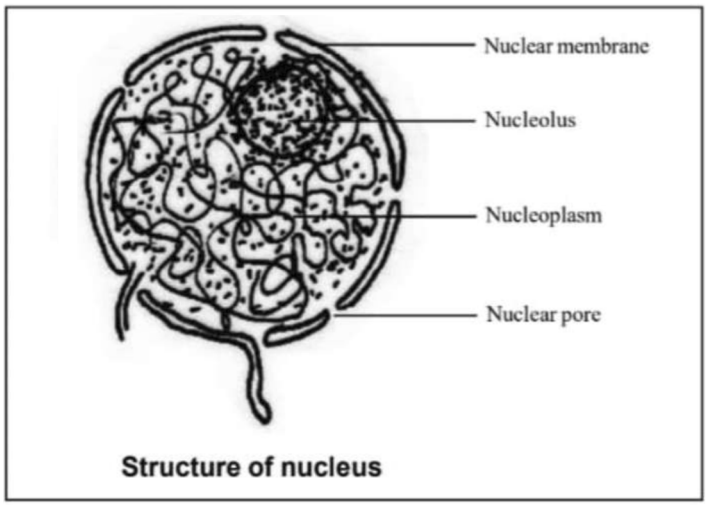
A.
- Nucleus was first described in 1831 by Robert Brown. Nucleus also known as "Brain" or Heart dynamic centre of the cell.
- The eukaryotic nucleus can be divided into four major parts they are

  1) Nuclear Membrane 2) Nucleoplasm
  3) Chromatin material 4) Nucleolus

1. Nuclear Membrane:- Nuclear envelope is double membrane structure, which con sists of two parallel membranes with a space between them called "Perinuclear space".

The outer membrance usually remain continuous with endoplasmic reticulum and also bears ribosomes on it. Minute pores found on the nuclear membrane are called "nuclear pores". They provide the passage for the movement of RNA and protein molecules in both directions between the nuclear and the cytoplasm.

2. **Nucleoplasm:-** Nucleus is filled with a fluid matrix called nucleoplasm. Nucleoplasm contain chromatin materials and nucleolus. Nucleolus is not membrane bound and its contents are continuous with the nucleoplasm.



Structure of nucleus

3. **Chromatin Material:-** The interphase nucleus has a loose and elaborate network of nucleoprotein fibres called chromatin. Chromatin contain DNA histone and non-histones etc.
4. **Nucleolus:-** One or more spherical structures present in the nucleoplasm are called nucleoli. They are usefull to production of ribosomes.

8. Give brief account of the types of chromosomes based on the position of centromere?

A. • Based on the position of the centromere, the chromosomes are classified in to four types namely

1) Metacentric 2) Sub metacentric 3) Acrocentric 4) Telocentric

1. Metacentric:-

i) The centromere is situated in middle position of the chromosome forming two equal arms of the chromosome.

ii) These chromosome appear as "V" shape during anaphase.

2. Sub-metacentric:-

i) The centromere near located to one end of the chromosome.

ii) These chromosome appear as "L" shaped during anaphase it results unequal arms one shorter arm and another longer arm.

3. Acrocentric Chromosome:-

i) The centromere is situated close to the end forming are extremely short and one very long arm in the chromosome.

9. What is Cytoskeleton? What functions is it involved in?

Ans. 1) An elaborate network of filamentous proteinaceous structures presnt in the cytoplasm is collectively referred to as cytoskeleton.

2) Eukaryotic cells contain three major components of cytoskeleton-namely micro filaments, intermediate filaments and microtubules.

3) The cytoskeleton in a cell is involved in many functions such as mechanical support, maintenance of cell shape, cell motility, intracelluar transport, signalling across the cell and karyokinesis (movement of chromosomes during cell division).

10. What is endomembrane system? What cell organelles are not included in it?

A. **Endomembrane System:-** A group of membranous cell organelles with co-ordinated in functions is termed as endomemebrane system.

★ Endomembrane system includes endoplasmic reticulum, golgicomplex, lysosomes and vacuoles.

★ Cell organelles like mitochondira, chloroplast and peroxisomes are not included in endomembrane system because the function of mitochondria, chloroplast and peroxi somes are not co-ordinated with endomembrane system.

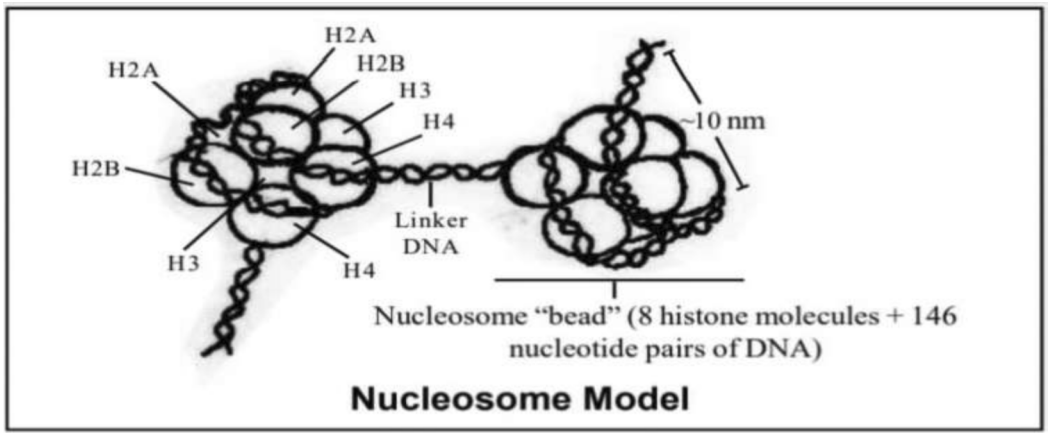
11. Distinguish between active transport and passive transport.

A.

Active Transport	Passive Transport
1. Active transport is the movement of molecule across the membrane with using metobolic energy is called Active Transport.	1. Passive transport is the movement of molecu les across the membrane without metabolic energy is called Passive Transport.
2. It is highly selective.	2. It is not selective in simple diffusion and highly selective in faciliated diffusion.
3. It occurs against concentration gradient.	3. It occurs along the concentration gradient.
4. Transporter proteins are required.	4. Transporter proteins are not required in simple diffusion.
5. Utilization of A.T.P.	5. A.T.P. does not utilized.

12. What are nucleosomes? What are they made of?

A. **Nucleosome:-** When the chromosome viewed under electronic microscope, chromatin appears as "beads on-string". These beads are known as nucleosomes.



Nucleosome Model

i) A typical nucleosome contains a core of histone octamer is wrapped by two turns of double helix DNA with 200 bp.

ii) In the octamer, eight histone protein of four types they are H2A, H2B, H3 and H4.

iii) The DNA is continuous between two successive nucleosome is called “Linker DNA”

iv) The specific packing of DNA inside the nucleus is faciliated by the association between negatively charged DNA and positively charged histones.

Note: According to scheme of valuation.. A.T. -2 Marks, P.T. -2 Marks.

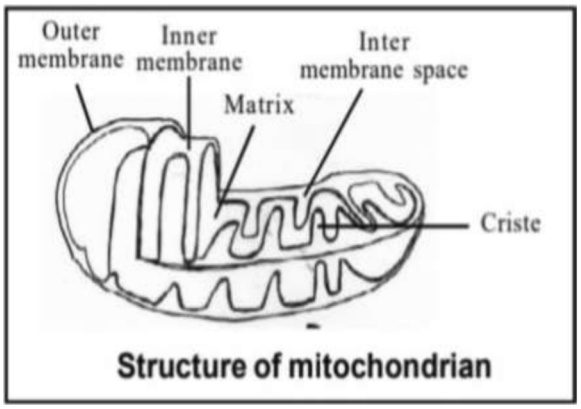
13. Name two cell-organelles that are double membrane bound. State their functions and draw labelled diagrames of both.

A. Mitochondria and Chloroplast are double membrane found cell organelles.

Mitochondria:

i) Mitochondria is a rod shaped cell organelle or sausage shaped or cylindrical.

ii) It is a double membrane bound structure with an outer membrane and the inner membrane dividing its lumen distictly into two components the inner component is called matrix.

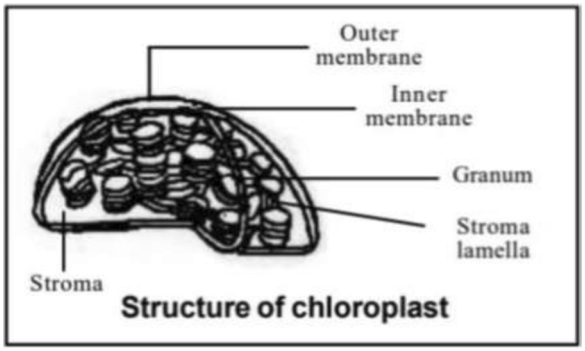


Structure of mitochondrian

Functions:

i) Mitochondria are the sites of Outer membrane Inner membrane Matrix Inter membrane space Criste Structure of mitochondrian aerobic respiration and generate cellular energy into the form of adenosine triphosphate (ATP), hence they are called power house of the cell.

ii) Cristae are the sites of oxidative phosphorylation and electron transport matirx is the site of Krebs cycle.



Structure of chloroplast

Characters of Chloroplast:

i) Chloroplast is a lens shaped, oval, spherical, discoid (or) ribben like organell.

ii) Each chloroplast is surrounded by an envelop which is made of two unit membranes that are separated by a "Periplastidia place" the innerspace of chloroplast is filled with a colour less matrix called "stroma".

Functions:

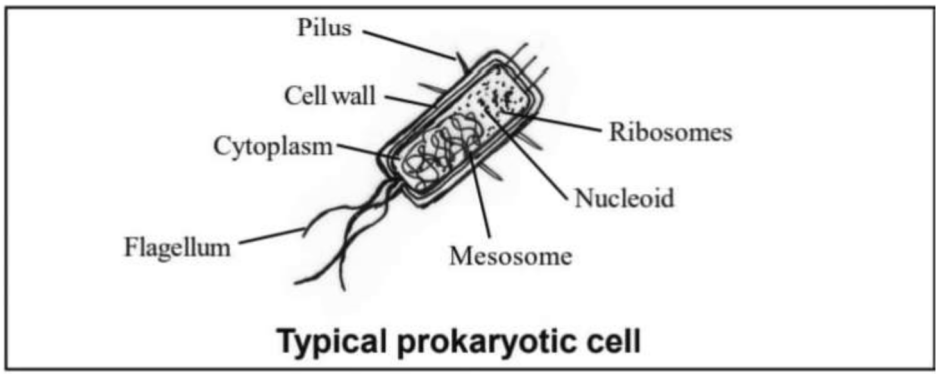
i) It help in "synthesis of food material" by process called photo synthesis.

ii) It can convert light energy into chemical energy in grana because grana have photo synthesis pigment.

14. What are the characteristics of a prokaryotic cell?

A. **Characters of Prokaryotic Cell:**

1. The prokaryotic cells are represented by bacteria blue-green algae, my coplasma.
2. All prokaryotes have a cell wall surrounding the cell membrane.
3. There is no well-defined nucleus.
4. Prokaryotes like some bacteria possess extra chromosomal DNA called "Plasmid".
5. Prokaryotes lack cell organelles except the presence of 70S types of ribosomes.
6. Prokaryotes have invigination in the cell membrane called "Mesosomes".
7. Prokaryotes cell envelop consists of Gycocalyx, Cell wall and Cell membrane.
8. Nucleous is absent.
9. Bacteria Cell able to move with flagella.



Typical prokaryotic cell

ESSAY ANSWER QUESTIONS (8 MARKS)

1. Justify the statement. Mitochondria are power houses of the cell.

A. Mitochondria and Chloroplast are double membrane found cell organelles.

Mitochondria:

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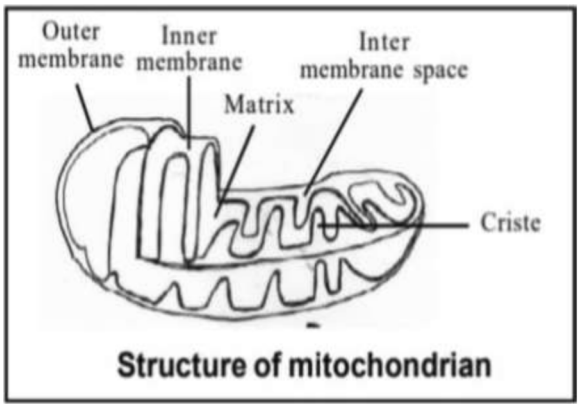

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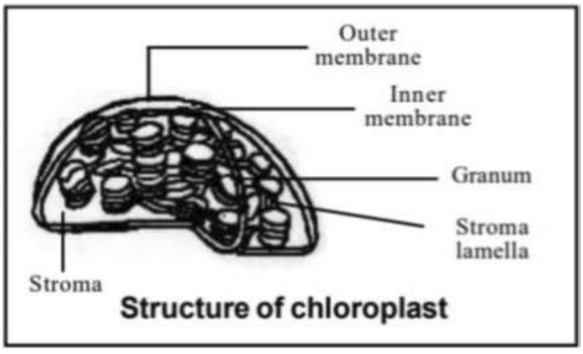


Structure of chloroplast

2. Write the functions of the following: (a) centromere (b) cell wall (c) SER (d) golgi complex.

Ans. **(a) Centromere**

1. Spindle fibres get attached to the centromere at the time of cell division.
2. Position of the centromere on the chromosome which aquires V.L.J.I shapes.

(b) 1. **Cell Wall** protect the protoplast from damage and infection.

2. Cell wall gives definite shape and mechanical strength.
3. It also helps in cell to cell interaction and acts as barrier.
4. Support intracellular transport.

(c) Smooth endoplasmic reticulum

1. The SER is the major sife for synthesis of lipid.
2. In animal cells lipid like steroidal hormones are synthesized.

(d) Golgi complex

1. It performs the function of packaging materials to be delivered either to intracellular or secreted outside the cell.
2. A number of proteins synthesized by ribosomes on the E.R. of Golgi complex.
3. It is the important site for glyco proteins, glyco lipids.
4. In plants Golgi complex involved in the synthesis of cell wall materials and also play a role in the formation of cell plate.

(e) Centroile

1. The centrioles form the basal body of cilia or flagella, and spindle fibres, that give rise to spindle apparatus during cell division in animal cells.

3. Are the different types of plastids interchangeable? If yes, give examples where they are getting converted from one type to another.

Ans. Yes. Plastids are inter changeable in form Generally three types of plastids are present in plant cells namely, leucoplasts (storage), chromoplasts (coloured, attraction) and chloroplasts (synthesis of food) Chromoplasts are coloured plastids (orange yellow or red), occurs in the cells of petals, fruits etc. They contain less chlorophylls and more carotenes (orange) or (red) and xanthophylls (yellow). The red colour of tomato is due to the presence of Iycopene in the chromoplasts. The chromoplasts of red algae contain phycocyanin and phycoerythrin. The chromoplasts of Brown algae contain fucoxanthin.

Depending upon circumstances, one type of plastid may be converted into another type.

For Ex:

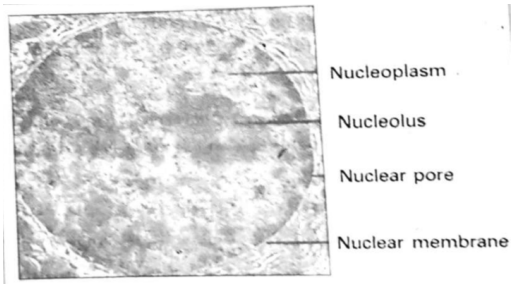
1) The leucoplasts in stem tubers of potato, on exposure to sunlight transofrm into chloroplasts.
2) In capsicum, the cells of ovary consists of leucoplasts. When ovary changes into fruit, leucoplasts are transformed into chloroplasts. When the fruit ripens chloroplasts are changed into chromoplasts.

4. Describe the structure of the following with the help of labelled diagrams.
i) Nucleus ii) Centrosome.

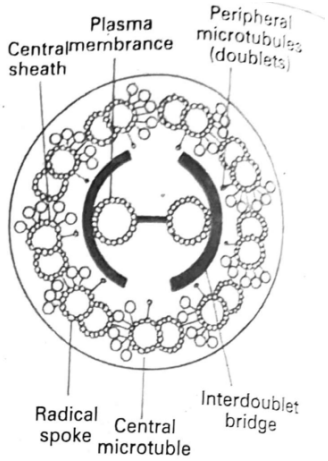
Ans. i) It was first discovered by Robert Brown. Later the material of the nucleus stained by the basic dyes was given the name chromatin by Flemming. The interphase nucleus as highly extended and elaborate nucleoprotein fores called chromatin, nuclear matrix and one or two nucleoli. Electron has revealed that the nucleus is covered by double

layered nuclear envelope, with a space between called perinuclear space, forms a barrier between materials present inside the nucleus and the cytoplasm.

★ The outer nuclear envelope remains continuous with the endoplasmic reticulum and also bears ribosomes. At a number of places, the nuclear envelope is interrupted by nuclear pores, which allows the passage of RNA and protein molecules in both directions between the nucleus and cytoplasm. The nucleoplasm contains nucleolus and chromatin. The nucleoli and spherical structures, involved in active ribosomal RNA synthesis. The chromatin, in different stages of cell division, become chromosomes. They contain DNA and some basic proteins called histones and also RNA. Nucleus plays an important role in biogensis of ribosomes. It plays a significant role in mitosis.



Structure of nucleus



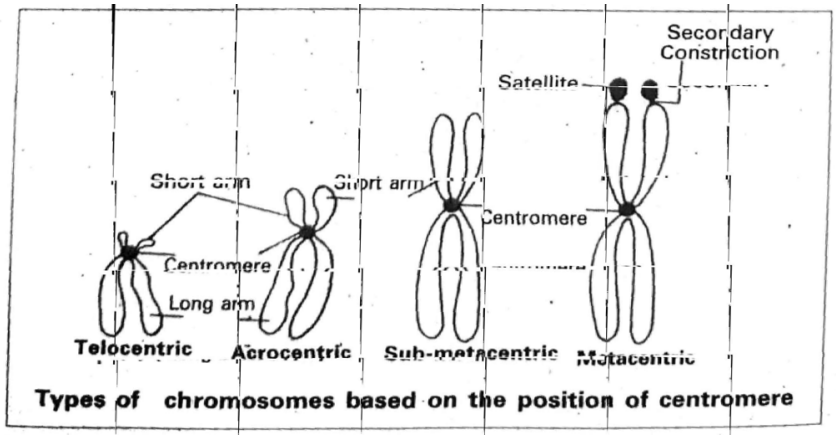
Diagrammatic representation of Internal Structure

ii) **Centrosome:** Centrosome is an organelle usually containing two cylindrical structures called centrioles. They are surrounded by amorphous pericentriolar materials. Both the centrioles in al centrosome lie perpendicular to each other in which each has an organisation like cartwheel. They are made up of nine evenly spaced peripheral fibrils of tubulin. Each of the peripheral fibril is a triplet. The adjacent. triplets are also linked. The central part of the centriol is also proteinaceous and called the 'hub', which is connected with tubules of the peripheral triplets by radial spokes made of protein. The centricles form the basal body of cilia and flagella and spindle fibres that give rise to spindle apparatus during cell divirsion in animal cells.

5. What is a centromere? How does the position of centromere form the basis of classification of chromosomes. Support your answer with a diagram showing the position of centromere on different types of chromosomes.

Ans. Centromere is the region of chromosome that becomes attached to spindle fibres. Special proteins surrounded the centromere. They form a disc shaped structures called kinetochores. Each chromosome shows centromere at a specific position. Basing on the position of centromere four types chromosomes are recognised. They are:

1) **Metacentric:** "If the centromere is situated at mid point of a choromosome". It is "V" shaped and consists of two equal arms..



Types of chromosomes based on the position of centromere

2) **Sub-metacentric:** "If the centromere is situated slightly away from mid point of a chromosome. It is 'L' shaped. It consists of two unequal arms.
3) **Acrocentric:** If the centromere is situated at the sub terminal position of a chromosome. It is rod shaped or "J" shaped. It consists of very long arm and a very small arm.
4) **Telocentric:** "If the centromere is situated at the terminal position of a chromosome. It is “I” shaped and has only one arm.

❖❖❖❖❖❖

Chapter 10: BIOMOLECULES

VERY SHORT ANSWER QUESTIONS (2 MARKS)

1. Select an appropriate chemical bond among ester bond, Glycosidic bond, Pep tide bond and hydrogen bor and aganist each of the following.

A. Polysaccharide - Glycosidic bond
Protein - Peptide bond
Fat - Easter bond
Water - Hydrogen bond

2. Give one example for each of Amino acids, Sugars, Nucleotides and fatty acids?

A. Amino acids - Glycine
Sugars - Glucose
Nucelotides - Adenylic acid
Faty acids - Lecithin

3. Explain the zwitter Ionic form of an Amino acid.

A. $H\overset{+}{N}_3-\underset{|}{\overset{R}{C}}H-COO^-$ is a zwitter ionic form.

★ That means this Amino Acids Contains both Acidic (carboxylic) and basic (Amine) centres.

★ It is a Molecule containing both a positive and Negative charge, it is a neutral.

4.

A.

5. What constituents of DNA (De oxyribo Nucleic Acid) are linked by Glycosidic bond?

A. This bond is formed between two carbon atom of two Adjacent monosaccharides.

Nitrogen base is linked to sugar group laterally by Glycosidic bond.

6. Starch, cellulose, Glycogen, Chitin are polysaccharides found among the following choose the one appropriate and write aganist each.

A. a) Cotton fibre - Cellulose
b) Exoskeleton of cockroach - Chitin
c) Liver - Glycogen
d) Potato - Starch

7. What are primary and secondary metabolites? Give example.

A. **Primary metabolites :** Organic compounds such as carbohydrates, proteins, lipids etc. Present in cells of living organisms and name specific function in the cells.

Secondary metabolites: Alkolides, flavonoids, Rubbers, Antibiotics etc., that do not have Identifiable, functions in the host organism.

SHORT ANSWER TYPE QUESTIONS

1. Write a brief account on polysaccharides.

A. **Polysaccharides:-** The polysaccharides are acid insoluble carbohydrate macromolecules.

1) Polysaccharides are composed of long chain of sugars.

2) Polysacharides are threads containing different monosacharides as building blocks. Eg:- Cotton thread

3) Different polysaccharieds are made up of different building blocks for example

i) Cellulose $\rightarrow$ Glucose monomers
ii) Insulin $\rightarrow$ Fructose monomers
iii) Glycogen $\rightarrow$ Glucose monomers

4) Various types of polysaccharides are present in organisms for examples.

i) Glycogen $\rightarrow$ Animals
ii) Chitin $\rightarrow$ Exoskeleton of arthropods and cell wall of fungi
iii) N-acetyl glucosamine $\rightarrow$ Bacterial cell wall

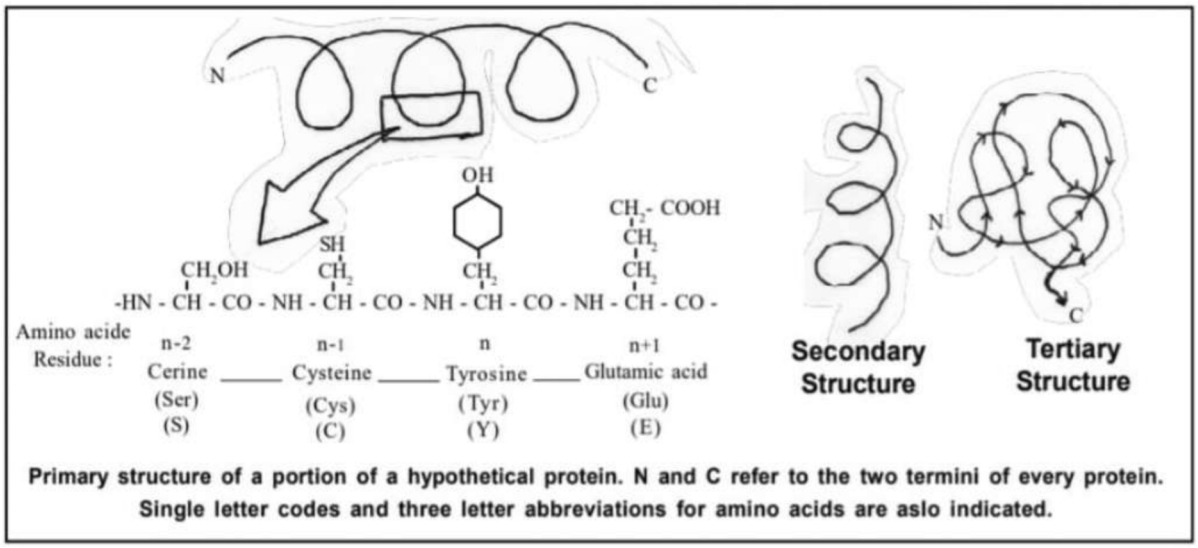
5) Polysaccharide molecules serves as energy reservoirs.

Eg:- Cellulosic cell wall's and external protection like in fungi, plant, exoskeleton of arthropods

2. Schematically represented primary, Secondary and Tertiary structure of a hypotheti cal polymer using protein as example.

A. Biological macromolecules like proteins undergoes into a folding process through which their biologically active form is produced it is a sequential folding result to form.

1) Primary 2) Secondary
3) Tertiary and 4) Qunternary Structure



Primary structure of a portion of a hypothetical protein. N and C refer to the two termini of every protein. Single letter codes and three letter abbreviations for amino acids are aslo indicated.

1. **Primary Structure:-** It is found in the form of linear sequence of amino acids. First amino acid is called N-terminal amino acid and last amino acid is called C-terminal amino acid.
2. **Secondary Structure:-** Polypeptide chain undergoes folding which is stabilized by hydrogen bonding. Right handed helices are observed.
3. **Tertiary Structure:-** Long protein chain is folding upon itself like a hollow wollen ball. Gives a three dimentional view of protein. Eg:-Myosin.

3. Nucleic Acid exhibits secondary strucutre, Justify with example.

A. 1) Yes, nucleic acid exhibits a wide variety of secondary structure

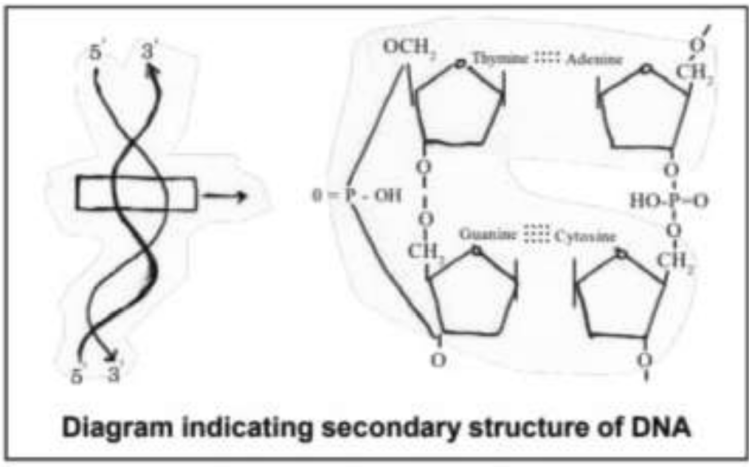


Diagram indicating secondary structure of DNA

2) For example the secondary structure of DNA is the famous model proposed by Watson and Crick.

3) According to this model DNA exists and double helix.

4) The two polynucleotide strands are antiparallel the backbone is formed by the sugar-phos phate sugar chain.

5) Nitrogen base are projected - perpendicular to the back bone facing inside.

6) Adenine (A) combine with Thymine (T) by two hydrogen bonds.

7) Guanine (G) combine with cytosine (C) by three hydrogen bonds.

8) One full turn of the helical strand would involve ten base pair. The length of one coil is 34 A° and the distance between base pair is 3.4Aº this type of DNA is called “B-DNA”.

ESSAY ANSWER QUESTIONS (8 MARKS)

1. What are secondary metabolites? Enlist them indicating their usefulness to man.

Ans. Metabolic products that do not have identifiable functions in the host organism are called secondary metabolites, Secondary metabolites ae alkaloides, flavonoides, rubber, essential oils, antibiotics, coloured pigments, scents, gums, spices etc., Many of these secondary metabolites are useful to man.

1)	Pigments	Eg : Carotenoids, Anthocyanins etc.
2)	Alkaloids	Eg : Morphine, Codeine etc.
3)	Terpenoids	Eg : Monoterpenes, Diterpenes etc.
4)	Essential oils	Eg : Lemon grass oil etc.
5)	Toxins	Eg : Abrin, Ricin
6)	Drugs	Eg : Vinblastin, Curcumin etc.
7)	Polymeric substances	Eg : Rubber, gums, cellulose etc.

2. Nucleic acids exhibit secondary structure. Describe through Watson & Crick Model.

Ans. 1. Nucleic acid exhibits a wide variety of secondary structures.

2. For example, one of the secondary structures exhibited by DNA is a famous Watson - Crick Model.

3. According to this model, DNA exists as a double helix. The two strands of polynucleotides are anti parallel i.e., run in the opposite direction.

4. The backbone is formed by the sugar - phosphate sugar chain.

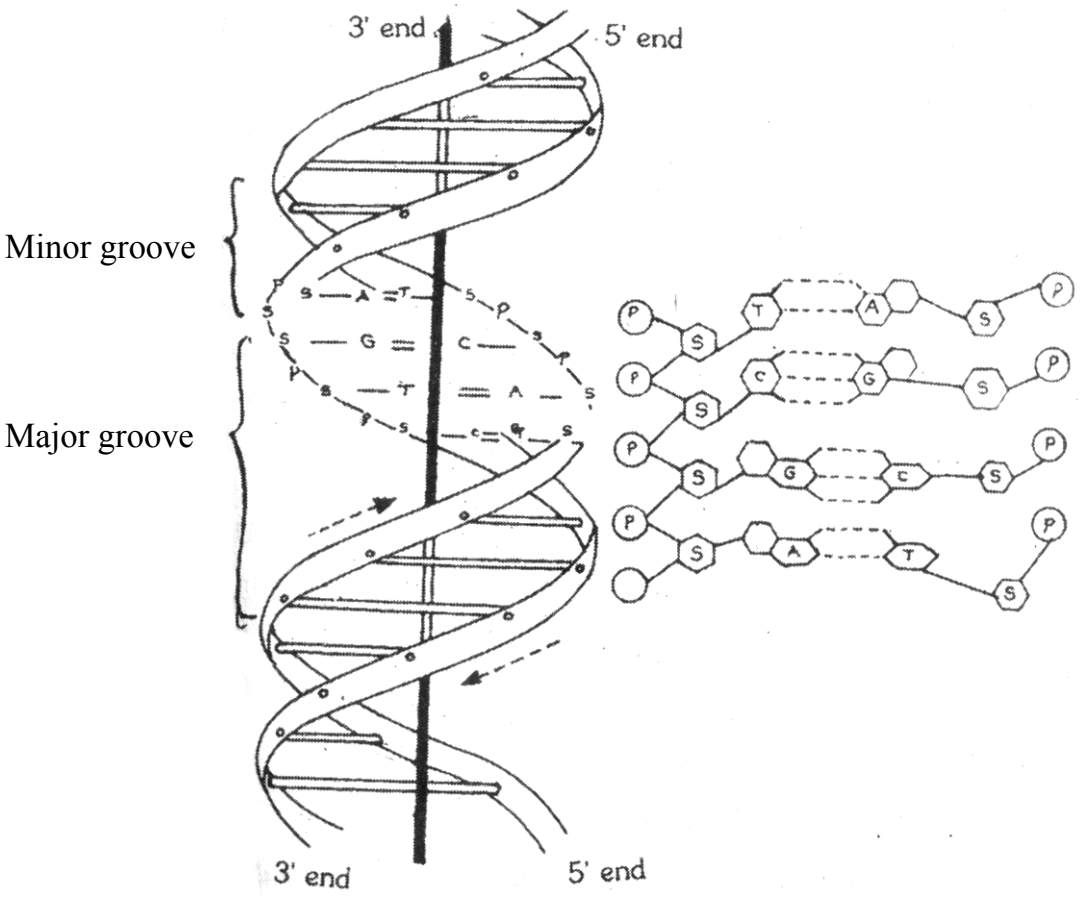
5. The nitrogen bases are projected more or less perpendicular to the back bone but face inside. Adenine (A) and Guanine (G) of one strand pairs with Thymine (T) and Cytosine (C) respectigely, on the other stand. Each step is represented by a pair.

6. Coiling occurs at an angle of 360^0. At each step turn is 36^0. One full turn of the helical strand involves 10 base pairs.

7. The length of each turn is 34Å.

8. The distance between two steps is 3.4Å.

9. This form of DNA with above features is called B-DNA.

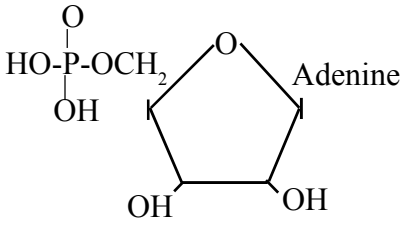


Watson and Crick's double helix model of DNA
P = Phosphate, S = Sugar, A = Adenine,
T = Thymine, G = Guanine, C = Cytosine

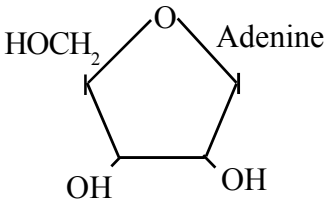
3. What is the difference between a nucleotide and nucleoside ? Give two examples of each with their structure.

A.

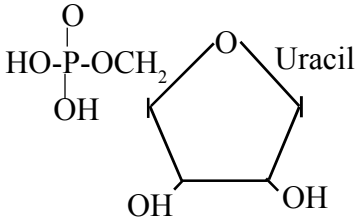
Nucleotide	Nucleoside
1. Nucleotide is made up of nitrogen base, sugar and phosphoric acid.	1. Nucleotide is made up of nitrogen base, and sugar.
2. Nucleotide of RNA is called **ribonucleotide** and nucleotide of DNA is called **dexyribo nucleotide.**	2. Nucleoside with ribose sugar is called riboside of ribo-nucleoside. Nucleoside with deoxyribose sugar is called deoxyribonucleoside.
3. **Example:** Adenylic acid, guanylic acid, cytidyolic acid, thymidylic acid, uridylic acid, AMP	3. **Example:** Adenosine, guanosine, cytidine, thymidine and uridine



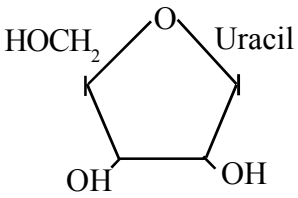
Adenylic acid



Adenosine



Uridylic acid
Phosphate + Sugar + Nitrogen base
(Nucleoside)



Uridine
Sugar + Nitrogen base
(Nucleoside)

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Chapter 11: CELL CYCLE AND CELL DIVISON

VERY SHORT ANSWER QUESTIONS (2 MARKS)

1. Between a prokaryote and a Eukaryote which cell has a shorter cell division time?

A. Prokaryotic cell.

2. Among prokaryotes and eukaryotes, which one has a shorter duration of cell. cycle?

A. Prokaryotic cell.

3. Which of the phases of cell cycle is of longest duration?

A. Interphase.

4. Which tissue of Animals and Plants exhibits meiosis?

A. Reproductive cells.

5. Given that the average duplication time of Ecoli is 20 minuts. How much time will two Ecoli cells take to become 32 cells?

A. 80 Minutes.

6. Which part of the Human body should one use to demonstrate stages in mitosis?

A. blood cells or bone marrow.

7. What attributes does a chromatid require to be classified as a chromosome?

A. Two chromatids attached to the centromere.

8. Which of the four chromatids of a bivalent at prophase - I of meiosis can in volve in cross over?

A. Non-sister chromatids.

9. If a tissue has at a given time 1024 cells, how many cycles of mitosis had the original parental single cell undergone?

A. 10 cycles of mitosis.

10. An anther has 1200 pollengrains how many pollen mother cells must have bee there to produce them.

A. 300 pollen mother cells.

11. At what stage of cell cycle does DNA synthesis occurs?

A. S or Synthetic phase.

12. It is said that one cycle of cell division in Human cells take 24 hours? Which phase of the cycle, do you think occupies the Maximum part of cell cycle?

A. Inter phase.

13. It is observed that heart cells do not exhibit cell division. Such cells do not divide further and exit...phase to enter an Inactive stage called....of cell cycle fill in the blanks.

A. 1. G1
2. Go (quiscent stage)

14. Name the stage of meiosis in which Actual Reduction in chromosome number occurs.

A. Anaphase-1.

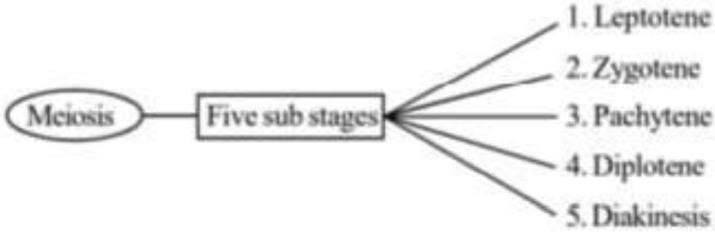
15. Mitochondria and plastids have, thier own DNA what is thier fate during nuclear division like mitosis?

A. At the time of cytoplasmic division organells like mitochrondria and plastids get distrib uted between two daughter cells.

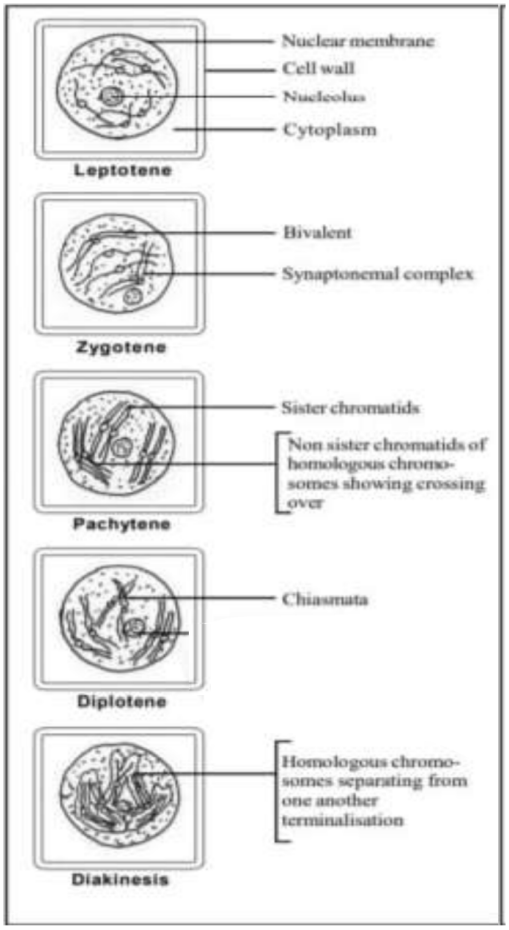
SHORT ANSWER QUESTIONS (4 MARKS)

1. Explain prophase I of meiosis.

A. Meiosis is longer and consists of five sub phase they are namely
1) Leptotene, 2) Zygotene, 3) Pachytene, 4) Diplotene and 5) Diakinesis



1. **Leptotene:-** The nucleus increases in size by absorbing water from the cytoplasm. The chromo somes are long, slender and show beads like structures called chromomeres.
2. **Zygotene:-**Chromosomes (The homologous) start pairing together by a process called synapsis and result in the formation of "Synaptonemal Com plex". This complexed chromosomes are called biva lent or tetrad of chromatids.
3. **Pachytene:-** In this stage bivalent chromosome appear clearly as tetroids. Pachytene is characte rised by the appearance of recombination nodules which are the sites where crossing over occur between non sister chromatids of homologous chromosome. Here the exchange of genetic material between two homologous chromosome will take place by the involvement of recombinase enzyme. Crossing leads to recombination of genetic material an the two chromosomes and it is completed by the end of pachytene. Finally chromosome will leaved: from the links.



4. **Diplotene:-** The dissolution of the synaptone mal complex begins and the homologous chromo somes of the bivalents separate from each other and except at the sites of crossing over. These X Shaped structures are called "Chiasmata".
5. **Diakinesis:-** This is marked by terminalisation of chiasmata chromosomes get fully condensed and the meiotic spindle is assembled to prepare the homologous chromosomes for separation by the end of diakinesis the nucleous disappears.

2. Mention the key features of meiosis.

A. 1. Mention involves two sequential cycles of nuclear and cell division called meiosis-I and meiosis-II but only a single of DNA replication.
2. Meiosis-II is initiated after the parental chromosome have replicated to produce identical sister chromotids at the S phape.
3. Meiosis involves pairing of homologous chromosomes and recombination between them.
4. Four haploid cells are formed at the end of meiosis-II

Meiotic even cab be grouped under the following

Meiosis-I	Meiosis - II
Prophase - I	Prophase-II
Metaphase -I	Metaphase - II
Anaphase - I	Anaphase - II
Telophase - I	Telophase - II

3. Which division is necessary to maintain constant chromosome number in all body cells of multicellular organism and Why?

A. • Mitosis division is necessary to maintain constant chromosome number in all body cells of multicellular organisms.

because

1. The type of division in somatic cells is mitotic only and in multicellular organisms life cycle start with a single cell called zygote. The zygote is diploid cell and shows different levels of organism and finally develop into organism. All these cells have same number of chromosome.
2. Mitosis result in the production of diploid daughter cells with identical material to that of the parental cell. So, the growth of multicellular organism due to mitosis.
3. Cell growth result in distributing the ratio between the nucleus and the cytoplasm. It there fore becomes essential for the cell to divide to restore the nucleo cytoplasmic ratio.
4. Mitotic divisions in the meristamatic tissues, the apical and the lateral meristems result in a continuous growth of plant through out their life.

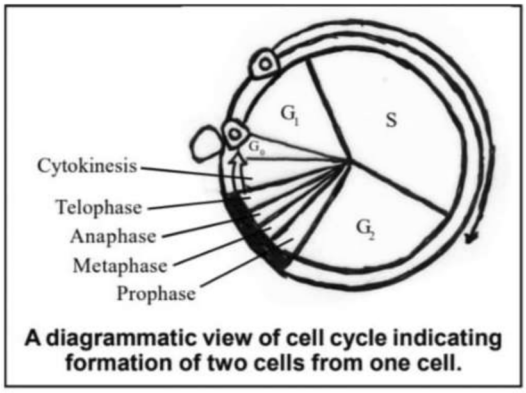
4. Through redundantly described as a resting phase, interphase does not really involv rest. Comment.

A. **Interphase:-**During interphase, the cell is growing and preparing for mitosis by accumalati nutrients and replicating DNA. Inter phase is longest phase in cell cycle. Through this phase is some time called resting stage, but it is infact the most active phase of the cell cycle.

The inter phase divided into three phases they are

1) G1 phase (Gap 1) 2) S phase (Synthesis) 3) G, phase (Gap 2)

1. **G1 phase:-** G_1, stage separates end of mitosis and the start of synthesis phase. During G phases the cell is metabolically active and continuously grows but does not replicate its DNA.
2. **S phase:-** Synthesis phase mark the period during which DNA synthesis or replication tak place. During this time the amount of DNA per cell double. If the intial amount of DNA is denot as 2c, then it is increase to 4c. However there is no increase in the chromosome number.



A diagrammatic view of cell cycle indicating formation of two cells from one cell.

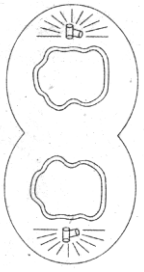
3. **G_2 phase:-** During the G_2 phase proteins are synthesised in preparation for mitosis while cell growth continues. "Hence inter phase is not a resting phase".

Note: According to scheme of valuation.. G_1 - 1 M, S-1 M, G_2-1 M, Diagram - 1 M

LONG ANSWER TYPE QUESTIONS

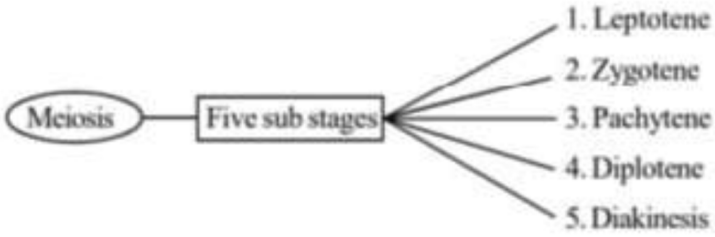
1. Discuss on the statement-Telophass is reverse of prophase.

A. * The changes occurring in telophase are almost reverse to those which take place in prophase.
* The daughter chromosomes reach opposite poles.
* These daughter chromosomes lengthen and their visibility decreases due to decondensation of chromatin.
* The kinetochore fibres disapperar.
* The nuclear membrane reappears.
* Nucleolus, golgi complex and ER reform.
* Thus at the end of elophase, two independent daughter nuclei are organised in the same mother cell.


Telophase

2. What are the various stages of meiotic prophase I ? Enumerate the chromosomes events during each disease.

A. Meiosis is longer and consists of five sub phase they are namely
1) Leptotene, 2) Zygotene, 3) Pachytene, 4) Diplotene and 5) Diakinesis



1. **Leptotene:-** The nucleus increases in size by absorbing water from the cytoplasm. The chromo somes are long, slender and show beads like structures called chromomeres.
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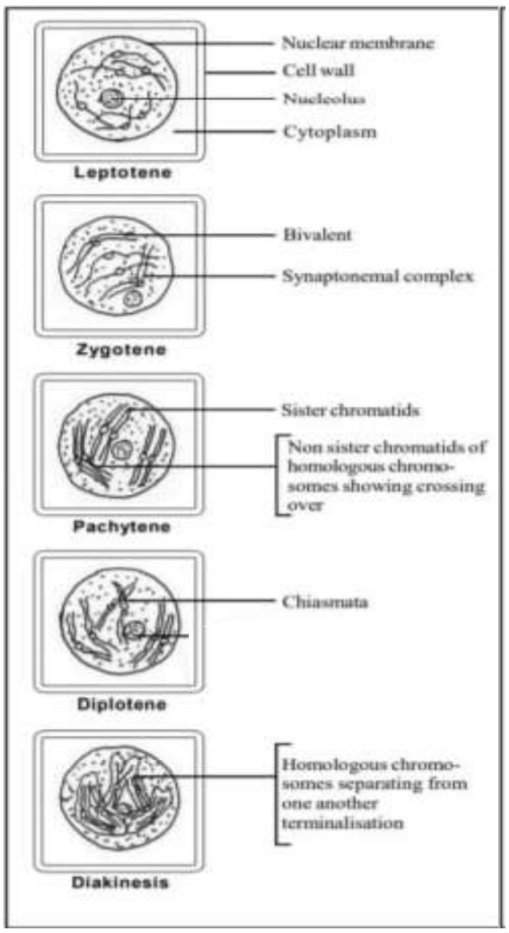

2. Differentiate between the events of mitosis and meiosis.

Ans

Mitosis	Meiosis
1. It occurs in both haploid and diploid organisms.	1. It occurs only in diploid organisms.
2. It occurs in somatic cells.	2. It occurs in the reproductive cells.
3. Nucleus divides once.	3. Nucleus divides twice.
4. Daughter cells are identical.	4. Daughter cells are not identical
5. Two daughter cells are formed.	5. Four daughter cells are formed.
6. Prophase is simple.	6. Prophase is complicated and shows five sub-stages.
7. Pairing of chromosomes does not occur.	7. Homologous chromosomes pair to form bivalents.
8. Both chaismata and crossing over are absent.	8. Crossing over occurs between non-sister chromatids and chiasmata are formed
9. Centromeres undergo division in anaphase.	9. Centromeres do not divide in anaphase-I but divide in anaphase-II.
10. Daughter chromosomes move to the opposite poles.	10. Bivalents are separated. They move t op posite ples.
11. The chromosome number of daughter nuclei is unchanged.	11. The chromosome number of daughter nuclei is reduced to half.
12. Duration of time is less.	12. Duration of time is more.

4. Write brief note on the following:

a) Synaptonemal complex

b) Metaphase plate

A. **a) Synaptonemal complex:** During the Leptotene of prophase I, chromosome start pairing together and this process of association is called **synapsis.**

1) Such paired chromosomes are called homologous chromosome.

2) Electron micrographs of this stage indicate that chromosome synapsis is accompanied by the foramtion of complex structure called synoptonemal **complex**.

3) The complex formed by a pair of homologous synapsed homologous chromosomes is called a bivalent or a tetrad of chromatids.

b) Metaphase plate: In Metaphase two important changes take place.

1) Formation of bipolar spindle fibres and attach the same to the kinetochores of chromosomes.

2) All the chromosomes lie at the equator.

3) The plane of alignment of the chromosomes at metaphase is referred to as the metaphase plate or equatorial plate.

5. Write briefly the significance of mitosis and meiosis in multicellular organism.

A. **Significance of mitosis:**

1) Growth in organism is caused by mitosis and it restores the surface or volume ratio of the cell.
2) The daughter cells formed by motosis are identical with the mother cell. Hence it is important in conserving the genetic integrity of the organism.
3) In unicellular organisms, mitosis helps in reproduction.
4) Mitosis helps in wound healing and regeneration of lost plant parts.
5) Mitosis helps for grafting in vegetative reproduction.
6) It maintains a constant number of chromosomes in all the cells of the body.

Significance of meiosis:

1) It helps in the maintenance of a constant chromosome number from one generation to the next.
2) Due to crossing over, genetic recombinations are caused which help in genetic variation and origin of new species and leads to evolution.

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Unit **6**

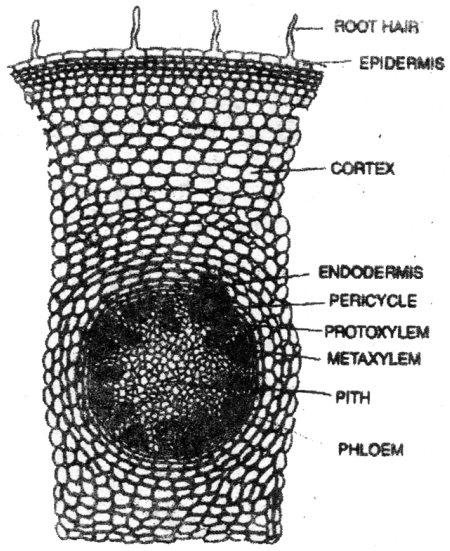
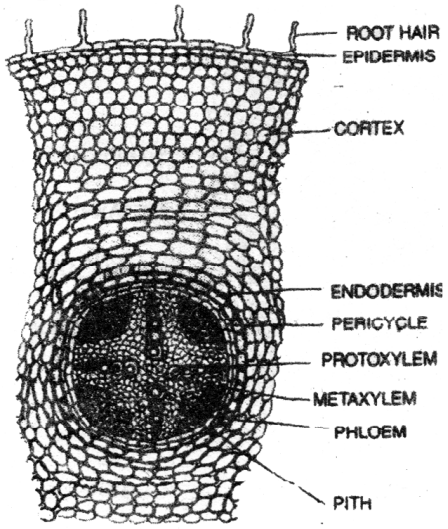
INTERNATIONAL ORGANISATION OF PLANTS

Chapter 12: ANOTOMY OF FLOWERING PLANTS

LONG ANSWER QUESTIONS

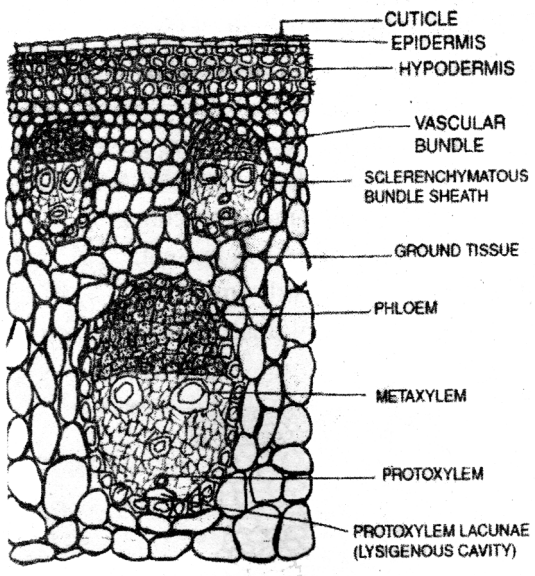
1) Draw illustrations to bring out the anatomical differences between a) Monocot root and Dicot root b) Monocot stem and dicot stem

a.

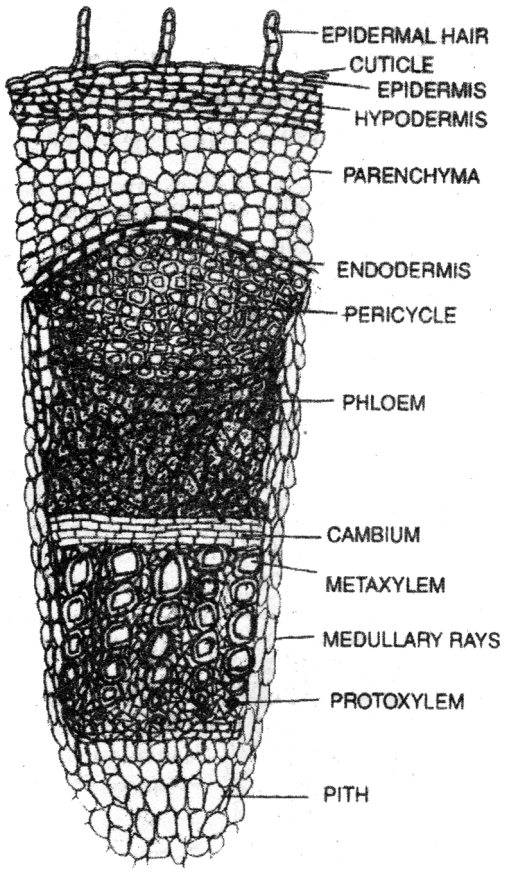
Monocot Root	Dicot Root
1. Pericycle produces only lateral roots	1. Pericycle produces lateral roots & Vascular cambium develop during secondary growth
2. Vascular bundles are more than six	2. Vascular bundles range from two to four.
3. Pith is large and well developed	3. Pith is small or inconcspicuous
4. Secondary growth is absent	4. Secondary growth is present
5. Cortex is big	5. Cortex is relatively smaller
6. Medulla is very big	6. Medulla is very small or absent
	
Monocot Root	**Dicot Root**

b. Differences between Monocot stem and Dicot stem

Monocot Stem	Dicot Stem
1. Trichomes are absent	1. Trichomes are present
2. Cortex is highly reduced	2. Cortex is well developed
3. Hypodermis is sclerenchymatous	3. Hypodermis is collenchymatous
4. Endodermis is absent	4. Endodermis is present as starch sheath
5. Pericycle is absent	5. Pericycle is present
6. Vascular bundles are numerous	6. Vascular bundles are few in number
7. Vascular bundles are oval shaped	7. Vascular bundles are wedge shaped
8. Vascular bundle is enclosed by fibrous sheath (fibro-vascular bundle)	8. Vascular bundle is not enclosed by fibrous sheath
9. Vascular bundles are closed type	9. Vascular bundles are open type
10. Xylem vessels are more in number	10. Xylem vessels are more in number
11. Protoxylem lacunae are present	11. Protoxylem lacunae are absent
12. Medulla and medullary rays are absent	12. Medulla and medullary rays are present
13. Vessels are in "Y" shape	13. Vessel are in serial order
14. Phloem parenchyma is absent	14. Phloem parenchyma is present



T.S of Monocot stem



T.S of Dicot stem

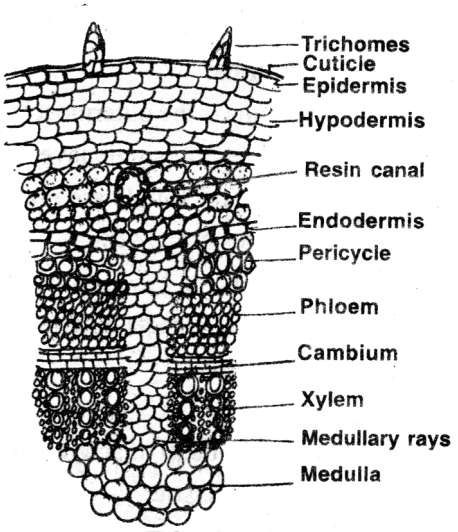
2) Describe the T.S Of a Dicot Stem

A. T.S of Dicot Stem shows three main parts. They are 1. Epidermis II. Cortex III. Stele

I. Epidermis:

1. Epidermis is the outermost layer.
2. It is made up of single layered parenchymatous cells
3. Stomata and cuticle are present
4. Trichomes are present and they prevent the entry of pathogenic micro organisms
5. Stomata helps for gaseous exchange
6. Epidermis protects innermost tissues.

II. Cortex: The part between epidermis and stele is called cortex. It has three subzones i) Hypodermis ii) General Cortex iii) Endodermis.



T.S of Dicot Stem

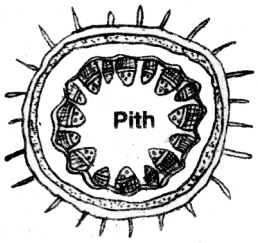
i) Hypodermis:

1. Hypodermis is present below the epidermis
2. It is madeup of collenchyma and gives mechanical strength.
3. Hypodermis helps in photosynthesis.

ii) General Cortex:

1. It is found beneath the hypodermis and is made up of 5 to 10 rows of thin walled parenchyma.
2. Shape of cortex cell is oval or spherical
3. They are arranged loosely without any intercellular spaces
4. General cortex helps in storage.

iii) Endodermis:



1. Inner most layer of cortex is called Endodermis
2. The cells are barrel shaped; compactly arranged without any intercellular spaces.
3. The radial walls show lens shaped thickenings called casparian bands
4. Endodermal cells contain starch grain. Hence, it is also known as starch sheath.

III Stele: Stele is the central conducting cylinder.

It occupies major part of of the stem and is well developed.

It is composed of i) Pericycle ii) Vascular bundles iii) Medulla iv) Medullary Rays

i) Pericycle: It is the region between the endodermis and vasculary bundles.

ii) Vascular bundles:

- Some 15 to 20 Vascular bundles are arranged like a ring, called "Eustele".
- Each Vascular bundle is wedge shaped, conjoint, collateral, open.
- The vascular bundles are concerned with the conduction of water, salts and food materials.
- Xylem is Endarch. In between the phloem and xylem, fasicular cambium is present.

iii) Medulla:

- Medulla is the large central part of steel and is madeup of parenchyma
- It helps in storage.

iv) Medullary rays:

- The cells of medulla extend to the periphery in between vascular bundles
- The medullary rays help in lateral conduction.

3) Describe the T.S of Monocot stem.

A. T.S of Monocot stem shows Four main parts. They are

1. Epidermis II. Hypodermis III. Ground tissue IV. Vascular bundles

I. Epidermis:

1. Epidermis is the outermost layer.
2. It is madeup of single layered parenchymatous cells
3. Stomata and cuticle are present.
4. Trichomes are absent
5. Stomata helps for gaseous exchange
6. Epidermis protects inner most tissues.

II. Hypodermis:

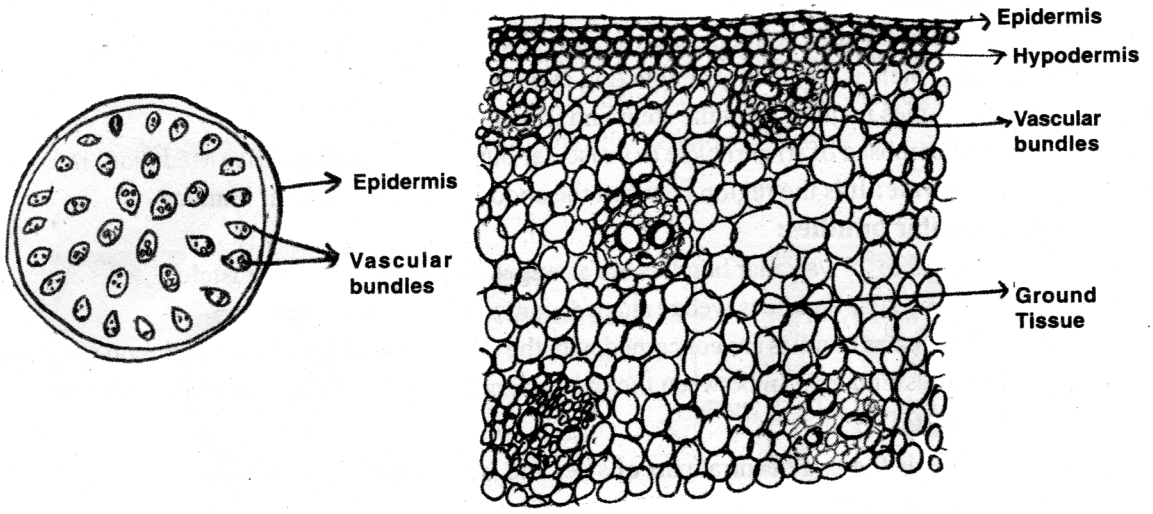
1. Hypodermis is present below the epidermis
2. It is made-up if sclerenchyma and gives mechanical strength.

III. Ground Tissue:

1. Except vascular bundles, remaining portion is called groud tissue.
2. It is made-up of parenchyma
3. It participates in synthesis of food materials and storage
4. Vascular bundles are scattered in the ground tissues.
5. In monocot stems, endodermis is absent.

IV Vascular bundles:

- Many vascular bundles are scattered in the ground tissue.
- Vascular bundles are surrounded by bundle sheath
- Cambium is absent
- Bundles are conjoint, Collatreal, closed.



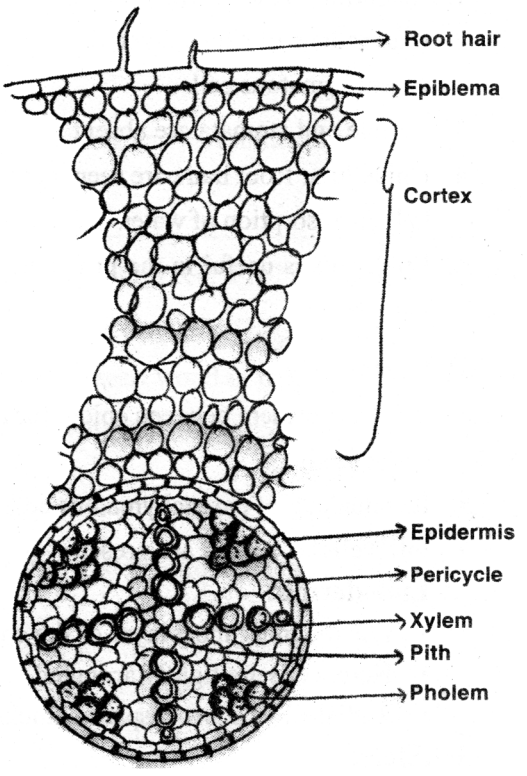
T.S of Monocot Stem

4) Describe the internal structure of a Dicot Root.

A. T.S of Dicot Root shows three main parts. They are 1. Epidermis II. Cortex. III. Stele

I. Epidermis:

1. Epidermis is the outermost layer.
2. It is madeup of single layered parenchymatous cells.
3. Cuticle and stomate are absent.
4. Unicellular Root hairs are seen and they help in absorption of water.
5. Epidermis is useful in the protection of inner tissue.



II. Cortex:

- The region between epidermis and stele is called Cortex
- In roots cortex is bigger than stele

i) Exodermis:

- It is 2 to 3 layered thick suberised cells.
- When epidermis is removed, exodermis acts as the protective layer.
- It prevents the exit of water from cortex

ii) General Cortex:

- It is present under the exodermis
- It is made up of parenchyma cells
- It helps in lateral conduction of water

iii) Endodermis:

- It is the inner most layer of the cortex.

- Here, cells are tightly arranged
- Radial walls show casparian thickenings

III) Stele:

- Stele is the central portion of a root
- It has i) Pericycle ii) Vascular bundles iii) Medulla

i) Pericycle:

- Pericycle is with single layer of cells surrounding the stele
- Lateral roots originate from pericycle cells

ii) Vascular bundles:

- Vascular bundles contain xyem and phloem on seperate radii
- Usually 4 xylem bundles alternate with 4 phloem bundles. This condition is called Tetrach.
- Number of bundles vary from one to four.
- Xylem is exarch. Xylem transports water. Phloem transports food materials.

iii) Medulla (or) Pith:

- Medulla is small (or) absent.
- Whenever medulla is preent, it will be made up of parenchyma. It helps in the storage of food and water.

5) Describe the internal structure of a Monocot Root

A. T.S of Monocot Root shows three main parts. They are 1. Epidermis II Cortex III. Stele

I Epidermis:

1. Epidermis is the outermost layer.
2. It is madeup of single layered parenchymatous cells
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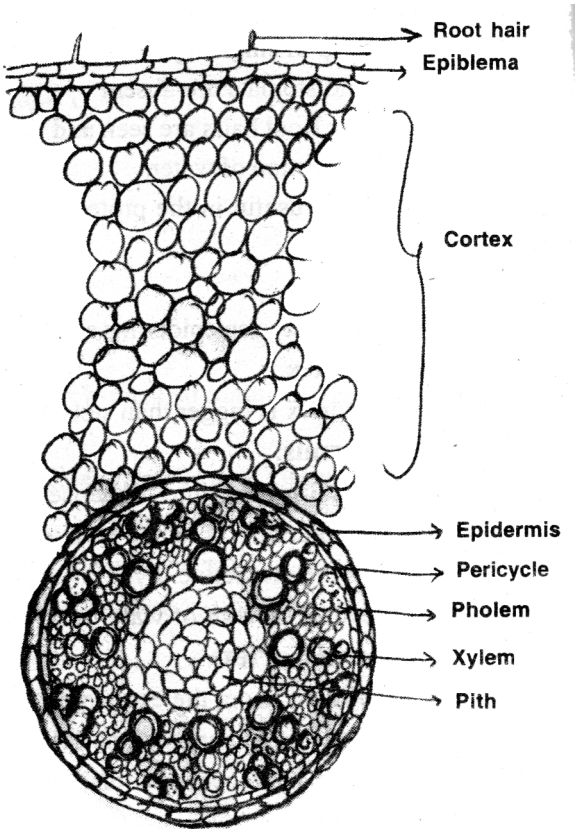
II Cortex:

- Cortex is present between epidermis and endodermis
- It is made-up of parenchymatous cells
- Intercellular spaces are present.

Endodermis:

- It is the inner most layer of the cortex



- Here, Cells are tightly arranged.
- Radial walls show casparian thickening

III Stele:

1. Stele is the central portion of root.
2. It has i) Pericycle ii) Vascular bundles iii) Medulla

i) Pericycle:

- It is a thin layer of cells found beneath the endodermis, surrounding the stele.
- It is madeup of parenchyma
- Lateral Roots are developed from pericycle

ii) Vascular bundles:

- Vascular bundles contain xylem and phloem on seperate radii.
- Number of bundles vary from 6 to 8
- Xylem is exarch. Xylem transports water. Phloem transports food

iii) Medulla (or) Pith:

- Medulla is well developed and is madeup of parenchyma
- It helps in storage.

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Unit 7

PLANT ECOLOGY

Chapter 13: ECOLOGICAL ADAPTATIONS, SUCCESSION AND ECOLOGICAL SERVICES

VERY SHORT ANSWER QUESTIONS (2 MARKS)

1. Name the type of land plants that can tolerate the salinties of the sea ?

A. *Halophytes
Ex:-Rhizophora.

2. Define heliophytes and sciophytes. Name a plant from your locality that is either heliophyte or sciophyte?

A. *Plants which grow in direct sunlight are called 'heliophytes"
Ex:-Tridax,grass plants, sun flower.
*Plants which grow in shady places are called "Sciophytes".
Ex:-Ferns, Mosses.

3. Define population and community ?

A. Population: A group of similar Individuals belonging to the same species found in an area.
Community : A community is an assemblages of all the populations belonging to different species found in an area.

4. Define communites ? Who classified plant communities into hydrophytes, mesophytes and xerophytes?

A. *A community is an assemblages of all the populatiion belonging to different species found in an area.
*Eugen warming.

5. Hydrophytes show reduced xylem. Why?

A. "Hydrophytes show reduced xylem'. because they can obsorb the water " from the body surface also".

SHORT ANSWER QUESTION (4 MARKS)

1. What are Hydrophytes ? Briefly discuss the different kinds of Hydrophytes with example?

A. *Plants that grow in water or in wet places are Hydrophytes . These are further sub-divided into five categories, according to their mode of living in water.

***Free floating hydrophytes:** These have no contact with soil and thus float freely on water surface.

Ex:-Pistia, Eichornia, Lemna, Salvinia

***Rooted hydrophytes with floating leaves :** Roots of these are fixed to substratum but their long petiolated leaves keep them floating on water surface.

Ex:-Nymphaea, Victoria regia.

***Sabmerged suspended hydrophytes:** These are not rooted in the mud. But they are completely sumberged and suspended in water.

Ex:-Hydrilla, Utricularia.

***Submerged rooted Hydrophytes:** These are rooted at the bottom of the pond and remain completely submerged in the water.

Ex:-Vallisnaria.

***.Amphibious plants**: These live partly in water and partly in air.

Ex:-Typha, Sagittaria, Limnophila.

2. Enumarate the morphological adaptations of hydrophytes?

A. **Roots:**

*Roots may be absent or poorly developed.

*Roots, if present are generally fibrous and unbranched or poorly branched.

*Root caps are usually absent. In some amphibious plants root caps are developed.

*In some plants, root caps are replaced by root packets. Ex:-Pistia.

Stem:

*Stem is lo**ng, slender flexible.**

Leaves:

*Leaves are thin, either long and ribbon shaped and linear or finely dissected.

*Floating leaves are large and float with their upper surfaces coated witgh wax.

3. List out the anatomial adaptations of hydrophytes?

A. *Cuticle is totally absent in the submeaged parts of the plants. It may be present in the form of very fine film on the surface of parts exposed to atmosphere.

*Stomata are totally absent in submerged hydrophytes.

*In plants with floating leaves the leaves are epistomatous (Stomata on upper surface)

*The epidermis is composed of thin walled cells and gases exchange takes place directly through the thin cell walls by diffiusion.

*All hydrophytes contain aerenchyma that helps in gaseous exchange and buoyancy.

*Mechanical tissues and xylem are poorly developed.

4. Write a brief account on classification of xerophytes?

A. *Plants growing in water deficient or physiologically dry habitats are called xerophytes.

* Xerophytes classified into the following three categeries.

1.Ephemerals 2.Succulents 3.Non succulents.

1. **Ephemerals:** These are annuals, mostly found in dry zones and complete their life cycle within a very short period Ex:-Tribulus.
2. **Succulents :** This absorb large quqantities of water during rainy season and store it in different plant parts usually in the form of mucilage. As a result plant parts become fleshy and succulent-Stored water is used during dry periods.

Ex: Succulent Roots -Asparagus
Succulent Stem-Opuntia
Succulent leaves-Aloe

3. **Non succulents:** These are perennial plants, can with stand prolonged period of drought. Ex:Casuarina.

5. Enumerate the morphological adaptatiions of xerophytes?

A. **Roots:**

Roots are long with extensive branching, spread over wide areas.

Roots hairs root caps are very well developed.

Stem:

Stems are stunted, woody hard and covered with thick bark.

Leaves:

Leaves are much reduced, small, scale like and sometime modified into spines to reduce the rate of transpiration.

6. Give in detail the anatomical adaptations of xerophytes?

A. *Epidermis is covered with thick cuticle to reduce the rate of transpiration.

*Epidermal cells may have silica crystals.

*Epidermis may be multilayered . Ex:-Nerium

*Stomata are generally present on lower epidermis, sunken stomata present in some plants. Ex: Nerium

*Mechanical tissues are well developed.

*Vascular tissues are well developed.

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