11th standard Bio-Botany Practical notes

Name:_____
Reg.No:_____
Subject:_____
Class:_____Section_____
Date:_____Batch_____
Session:_____Time_____

Identification

Q.No.	Topic
I. A. Preparation and Demonstration of Slides	
I. A	
II. B. Models	
II. B	
III. C. Taxonomy - Flower Dissection	
III. C	
IV. D. Nutrient test	
IV. D	
V. E. Physiology Experiment	
V. E	

Content

Bio-Botany Practical Question Paper

Time: 75 Min **Marks: 10**

I. Identify the given slide 'A' and give any two reasons. **1 mark**
(Identification – ½, Any two reasons – ½)

II. Identify the given specimen 'B' and give any two reasons. **1 mark**
(Identification – ½, Any two reasons – ½)

III. Identify the family, dissect and display the given flower 'C'. Write the floral characters of essential parts, draw floral diagram and write floral formula. (Identification – ½, Dissection – ½, Floral character – ½, Floral Diagram – ½, Floral formula – ½) **2½ mark**

IV. Test the given sample solution 'D' for the presence of Reducing sugar (Glucose), Starch, Proteins and Lipids. Write the principles and tabulate the result.
(Principle– ½, Test– ½, Table– ½) **1½ mark**

V. Write aim, procedure, observation and inference of the given plant physiological experiment setup'E'. (Aim – ½, Procedure and Observation – ½, Inference – ½) **1½ mark**

Total: 7½ mark
Record: 1½ mark
Skil: 1 mark
Maximum marks: 10

I.A - Preparation and Demonstration of Slides

A1. Bacteria - Lactobacillus

Identification: The given slide is identified as Bacteria – Lactobacillus.

Diagnostic Features:

1. They are unicellular and Prokaryotic organisms.
2. Mesosomes are present.
3. Involved in Lactic acid fermentation.

A2. Fungi - Yeast

Identification: The given slide is identified as Fungi – Yeast.

Diagnostic Features:

1. They are single celled eukaryotic organisms.
2. Reproduction by budding.
3. Cells are oval or spherical in shape.

A3. Fungi - Rhizopus

Identification: The given slide is identified as Fungi – Rhizopus.

Diagnostic Features:

1. Its commonly growing on bread.
2. It has aseptate, coenocytic mycelium.
3. Spore producting structure is called sporangium.

A4. Algae - Chlamydomonas

Identification: The given slide is identified as Algae – Chlamydomonas.

Diagnostic Features:

1. It is motile, unicellular green algae.
2. Its contain cup shaped chloroplast.
3. Locomotion by flagella.

A5. Algae - Volvox

Identification: The given slide is identified as Algae – Volvox.

Diagnostic Features:

1. It is a motile and colonial green algae.
2. This colonial structure is called coenobium.
3. Each colonies are connected by cytoplasm.

A6. Algae - Spirogyra

Identification: The given slide is identified as Algae – Spirogyra.

Diagnostic Features:

1. It is a unbranched, filamentous green algae.
2. Spiral shaped chloroplast is present.
3. Nucleus is present at the centre of the cell.

A7. Algae - Oedogonium

Identification: The given slide is identified as Algae – Oedogonium.

Diagnostic Features:

1. It is a unbranched, filamentous green algae.
2. Reticulate shaped chloroplast is present.
3. Basal cell is called Hold fast.

A8. Mitosis Cell division - Metaphase
Identification: The given slide is identified as Mitosis Cell division – Metaphase.
Diagnostic Features:
1. Spindle fibres are attached to the kinetochore region.
2. Chromosomes are distinctly visible in this stage.
3. Chromosomes are arranged at the equator region.

A9. Mitosis Cell division - Anaphase
Identification: The given slide is identified as Mitosis Cell division – Anaphase.
Diagnostic Features:
1. Each chromosome splits into two daughter chromatids.
2. Daughter chromatids are move towards opposite poles.
3. Shortening of spindle fibers are dividing the chromosomes.

A10. Dicot Root T.S. – Bean Root
Identification: The given slide is identified as Dicot Root T.S. – Bean Root.
Diagnostic Features:
1. Pith is absent.
2. Xylem exarch and tetrarch.
3. Radial vascular bundle is present.

A11. Dicot Stem T.S. – Sunflower Stem
Identification: The given slide is identified as Dicot Stem T.S. – Sunflower Stem.
Diagnostic Features:
1. Pith is present.
2. Hypodermis made up of collenchymas cells.
3. Conjoint, collateral and open vascular bundle.

A12. Dicot Leaf T.S. – Sunflower Leaf
Identification: The given slide is identified as Dicot Leaf T.S. – Sunflower Leaf.
Diagnostic Features:
1. Conjoint, collateral and closed vascular bundle.
2. Stomata surrounded by bean shaped guard cells.
3. stomata are more in number on the lower epidermis.

A13. Monocot Root T.S. – Maize Root
Identification: The given slide is identified as Monocot Root T.S. – Maize Root.
Diagnostic Features:
1. Radial vascular bundle.
2. Pith is present.
3. Exarch and polyarch xylem.

A14. Monocot Stem T.S. – Maize Stem
Identification: The given slide is identified as Monocot Stem T.S. – Maize Stem.
Diagnostic Features:
1. Pith is absent.
2. Homogenous ground tissues are present.
2. Skull shaped and scattered vascular bundles are present.

A15. Monocot Leaf T.S. – Grass Leaf

Identification: The given slide is identified as Monocot Leaf T.S. – Grass Leaf**.**

Diagnostic Features:

1. Conjoint, collateral and closed vascular bundle.
2. Mesophyll is not differentiated.
3. Stomata surrounded by dumb-bell shaped guard cells.

A16. Plasmolysis and Deplasmolysis

Identification: The given slide is identified as Plasmolysis and Deplasmolysis.

Diagnostic Features - Plasmolysis

1. Cell membrane is pulled away from the cell wall.
2. Cells becomes flaccid due to loss of water by exosmosis, when a plant cell is kept in a hypertonic solution.

Diagnostic Features – Deplasmolysis

1. It is reverse of plasmolysis.
2. It is a type of endosmosis.

II. B. Models

B1. Agaricus – Basidiocarp

Identification: The given specimen is identified as Agaricus – Basidiocarp.

Diagnostic Features:

1. Agaricus fruit body consist of stipe, annulus, pileus and gills.
2. Basidium exogenously produces four basidiospores.
3. Fertile region of gills is known as hymenium.

B2. Foliose Lichen

Identification: The given specimen is identified as Foliose Lichen.

Diagnostic Features:

1. Agaricus fruit body consists of stipe, annulus, pileus and gills.
2. Basidium exogenously produces four basidiospores.
3. Fertile region of gills is known as hymenium.

B3. Phylloclade – Opuntia

Identification: The given specimen is identified as Phylloclade – Opuntia.

Diagnostic Features:

1. It is a green, flattened stem.
2. Phylloclade is the stem modification.
3. Leaves are modified into spines for xerophytic adaptation.

B4. Special Inflorescence – Cyathium

Identification: The given specimen is identified as Special inflorescence – Cyathium.

Diagnostic Features:

1. It is a small unisexual flower.
2. Involucre protect flowers and consist of nectar.
3. Female flowers are surrounded by male flowers.

B5. Aggregate fruit - Polyalthia

Identification: The given specimen is identified as Aggregate fruit – Polyalthia.

Diagnostic Features:

1. A collection of simple fruitlets makes aggregate fruit.
2. Aggregate fruits are developed from single flower.
3. It has multicarpellary and apocarpous ovary.

III. C. - Plant Taxonomy - Flower Dissection

C1. Fabaceae – Clitoria ternatea

Identification : The given plant is identified as Clitoria ternatea belongs to the family Fabaceae.

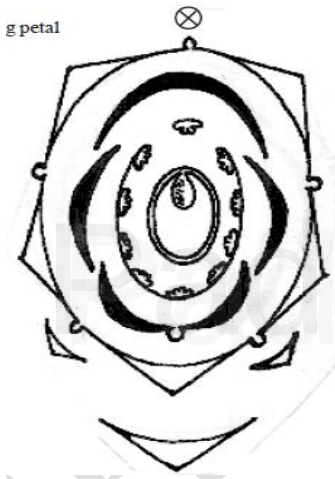
Dissect and display:

1.Calyx 2.Corolla 3.Androecium 4.Gynoecium.

Floral characters:

1. **Calyx:** Sepals 5, united, valvate aestivation.
2. **Corolla:** Petals 5, free, Papilonaceous corolla and descendingly imbricate.
3. **Androecium:** Stamens 10, diadelphous, (9) + 1.
4. **Gynoecium:** Ovary Superior, Monocarpellary,unilocular and ovules on marginal placentation.

Floral Diagram:



Floral formula: $Br.,Brl.,\%,\male,\female\ K_{(5)},C_5,A_{(9)+1},\underline{G}_1$

C2. Solanaceae – Datura metel

Identification : The given plant is identified as Datura metel belongs to the family Solanaceae.

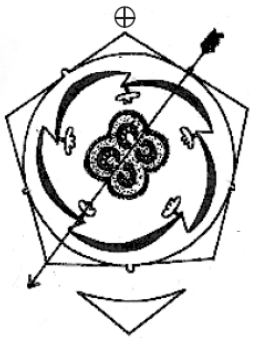
Dissect and display:

1.Calyx 2.Corolla 3.Androecium 4.Gynoecium.

Floral characters:

1. **Calyx:** Sepals 5,united,Valvate aestivation, persistent calyx.
2. **Corolla:** Petals5,Synpetalous, twisted aestivation and plicate.
3. **Androecium:** Stamens 5, epipetalous and alternipetalous.
4. **Gynoecium:** Bicarpellary, syncarpous and superior ovary, bilocular due to the formation of False septa.

Floral Diagram:



Floral formula: $Br.,Ebrl.,\oplus,\male,K_{(5)},\overset{\frown}{C_{(5)}},A_5,\underline{G}_{(2)}$

IV. D. Nutrient test

D1. Test for reducing sugar – Benedict reagent test

Aim:

To detect the presence of reducing sugar in the given sample solution.

Basic Principle:

1. Aldolses and Ketoses are reducing sugars.Glucose is the reducing sugar and sucrose is the non-reducing sugar.
2. When reducing sugar is heated with an alkaline solution of Benedict's solution reduces Cu2++ into Cu+ forming brick red precipitate of Copper (I) oxide.

Requirements:

Test tube, fruit juice of apple or leaves of onion or milk or sugar cane extract, benedict solution.

Table:

Procedure	Observation	Inference
1ml of sample solution + 1ml of Benedict's solution, Heated.	Appearance of brick red colour.	Reducing sugar is present.

Result:

Test tubes are submitted for evaluation.

D2. Test for starch – Iodine test

Aim:

To detect the presence of starch in the given sample solution.

Basic Principle:

1. Starch is the storage polysaccharide of plants.
2. It consist of two component a. amylose b. amylopectin
3. Amylose portion of starch react with Iodine (Potassium iodide) produces deep blue-black colour.

Requirements:

Test tube, Iodine solution, extract of potato or rice or wheat or maize grains.

Table:

Procedure	Observation	Inference
1ml of sample solution + 1ml of Iodine solution	Appearance of deep blue-black colour	Starch is present

Result:

Test tubes are submitted for evaluation.

D3. Test for Protein – Biuret test

Aim:

To detect the presence of protein.

Basic Principle:

1. Proteins are polymer of amino acids.
2. Amino group of one amino acid binds with carboxylic group of another amino acid to form peptide bond.
3. In alkaline medium $CuSO_4$ reacts with peptide bond and gives a purple colour.

Requirements:

Test tube, NaOH, $CuSO_4$ solution, Milk or albumin of egg or gram seed extract.

Table:

Procedure	Observation	Inference
2ml of sample solution + 1ml of NaOH + 2 drops of 1% Coper (II) sulphate and mix it well.	Appearance of Purple colour.	Protein is present

Result:

Test tubes are submitted for evaluation.

D4. Test for Lipids – Saponification Test

Aim:

To detect the presence of fats (lipid) in different plants and animal materials.

Basic Principle:

1. Lipids are esters of fatty acid and alcohol.
2. Lipids are not soluble in water and soluble in organic solvent like bezene, ether and chloroform.
3. Major groups of lipids are Triglycerides, Phospholipids, Steroids and Waxes.
4. Soapy appearance due break down of ester bonds by NaOH.

Requirements:

Test tubes, NaOH, oil or Ghee or Butter.

Table:

Procedure	Observation	Inference
1ml of sample solution + 1ml of 5 % NaoH solution and mix it well.	Appearance of Soapy solution.	Lipid is present.

Result:

Test tubes are submitted for evaluation.

V. E. Physiology Experiment:

E1. Potato Osmoscope experiment

Aim:

To prove osmosis by Potato osmoscope experiment.

Requirements:

Peeled potato tuber, concentrated sugar solution, water, beaker.

Procedure:

i) Take a peeled potato tuber and make a cavity inside
ii) Fill the cavity with concentrated sugar solution and mark the initial level.
iii) Place this setup in a beaker of pure water.
iv) After 10 minutes observe the sugar solution level and recorded.

Observation:

The level of sugar solution increased in the cavity of the potato tuber.

Inference:

It is proved that the increase in the level of sugar solution is due to osmosis.

E2. Paper Chromatography experiment

Aim:

To separate the photosynthetic pigments by paper chromatography method.

Requirements:

Fresh spinach leaves, chromatography paper, test tube, cork, petroleum ether, acetone, filter paper, funnel, beaker.

Procedure:

i) Grind a few spinach leaves with little fine sand and about 5 ml of acetone in a mortar and pestle. Filter it to get acetone extract of the leaf pigments.
ii) Take a narrow strip of chromatographic paper. Cut one end of the strip into a narrow notch.
iii) Put a drop of the pigment extract in the middle of the strip near the notch with the help of capillary tube.
iv) Take the test tube and pour about 5 ml of ether acetone solvent in it. Now hang the pigment extract loaded chromatographic strip in the test tube with the help of a split cork, in such a way that the loading spot lies about 1 cm above the solvent level.
v) Make the cork air tight and place the test tube undisturbed for some time, when solvent rises about 3/4th of the strip, take out the strip carefully and let it dry.

Observation:

After one hour observe the chromatographic paper. The Photosynthetic pigments being separated into four distinct bands. Different leaf pigments can be identified by their colours.

Inference:

Photosynthetic pigments chlorophyll b, chlorophyll a, xanthophyll and carotenes are separated on the chromatographic paper. Presence of different photosynthetic pigments in chloroplast is proved.

E3. Wilmott's bubbler experiment

Aim:

To determine the rate of photosynthesis by wilmott's bubbler experiment.

Requirements:

Wilmott's bubbler apparatus, Hydrilla twing, water.

Procedure:
i) Fill the bottle with water and insert Hydrilla twing into the wider part of the tube.
ii) Fix the tube with jar which acts as water reservoir.
iii) keep the apparatus in sunlight.
iv) Count the bubbles and repeat the experiment in different light intensity.
Observation: When there is an increase photosynthesis, bubble count also increased.
Inference: Rate of photosynthesis increases with increase of light intensity is proved.

E4. Experiment to demonstrate the production of CO_2 in aerobic respiration

Aim: To prove carbon dioxide is released by germinating seeds during respiration.
Requirements:
Conical flask, cork, beaker, a twice bent glass tube, test tube, thread, water, KOH solution, Germinating seeds of bean or gram or groundnut seeds.
Procedure:
i) Take 10 gm of germinating seeds green gram in the conical flask.
ii) Hang a small test tube containing Potassium hydroxide (KOH) crystal inside the flask with the help of a thread.
iii) Introduce one end of the bent glass tube into the conical flask through the cork.
iv) Dip the free end of the tube in a beaker containing water.
v) Make the apparatus air tight and fix the apparatus with the help of a stand.
vi) Note the initial level of water in the bent glass tube and keep the apparatus undisturbed.
Observation: After two hours the level of water rises in the glass tube.
Inference: i) CO2 released by the germinating seeds is absorbed by KOH solution.
ii) Liberation of carbon dioxide during respiration by germinating seeds is proved.

E5. Arc auxanometer experiment

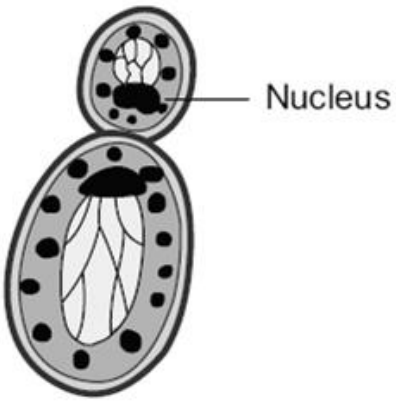
Aim:
To measure the growth of a plant in length by Arc auxanometer experiment.
Requirements:
Arc auxanometer, Potted plant, weight, thread.
Procedure:
i) Arc auxanometer which consists of a small pulley to the axis of which is attached a long pointer sliding over graduated arc.
ii) One end of a thread is tied to the stem tip and another end to a weight passes over the pulley tightly.
iii) Note down the initial reading of the pointer. Keep the set up for a week.
Observation:
i) The stem tip grows in length, the pulley moves, and the pointer slide over the graduated arc.
ii) The distance travelled by the pointer is noted down.
Inference:
Actual growth in length is calculated with help of this formula.

$$\text{Actual growth in length} = \frac{\text{Distance tracelled by the pointer x Radius of the pulley}}{\text{Length of the pointer}}$$

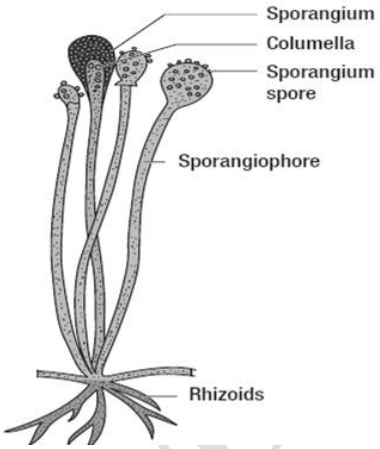
****

A1. Bacteria – Lactobacillus

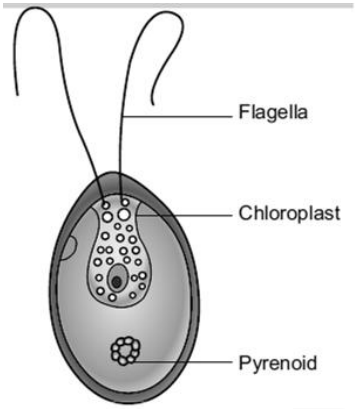
A2. Fungi – Yeast



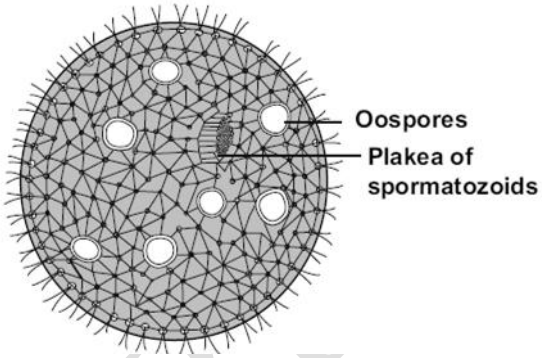
A3. Fungi - Rhizopus



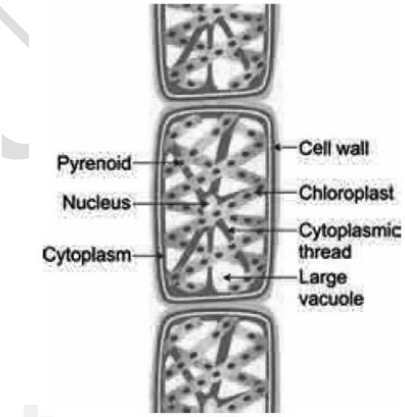
A4. Algae – Chlamydomonas



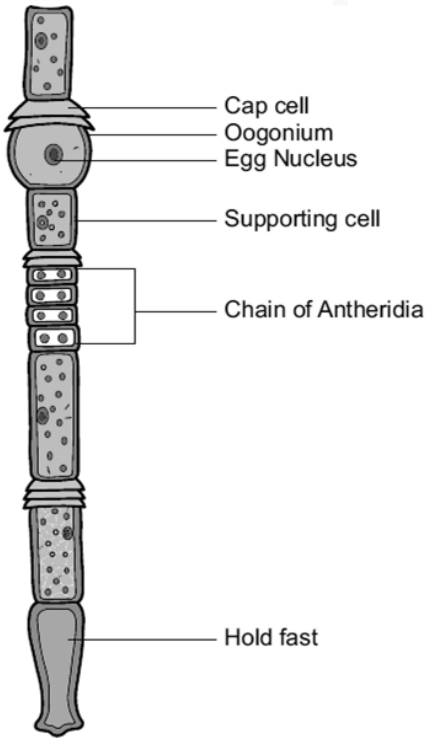
A5. Algae – Volvox



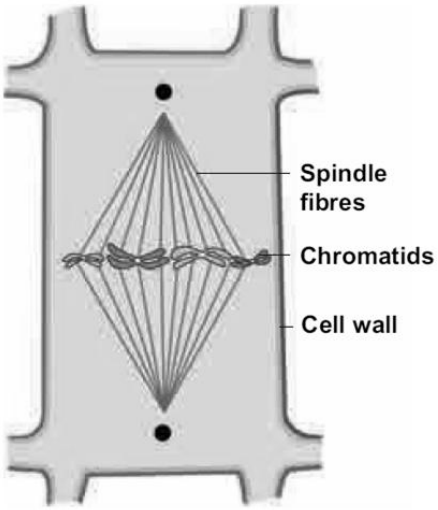
A6. Algae - Spirogyra



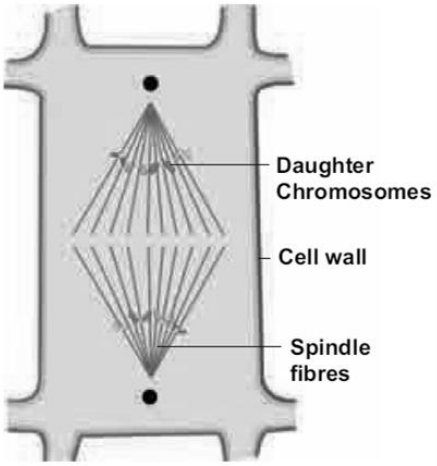
A7. Algae – Oedogonium



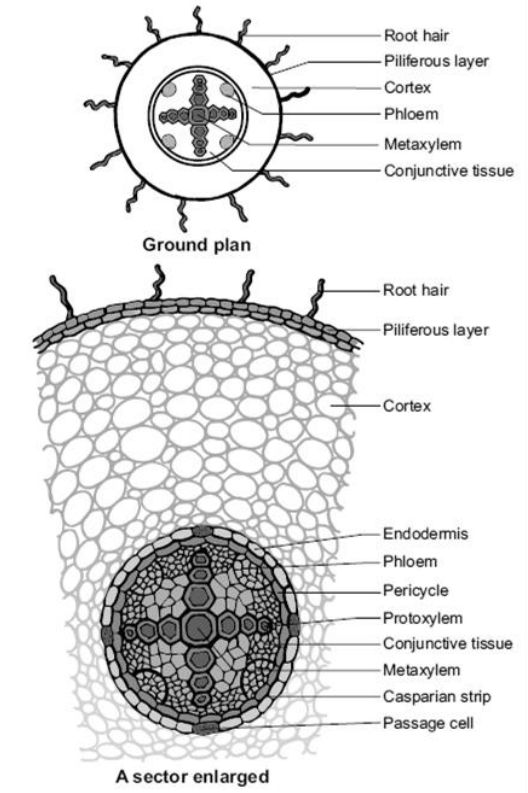
A8. Mitosis Cell division Metaphase Stage



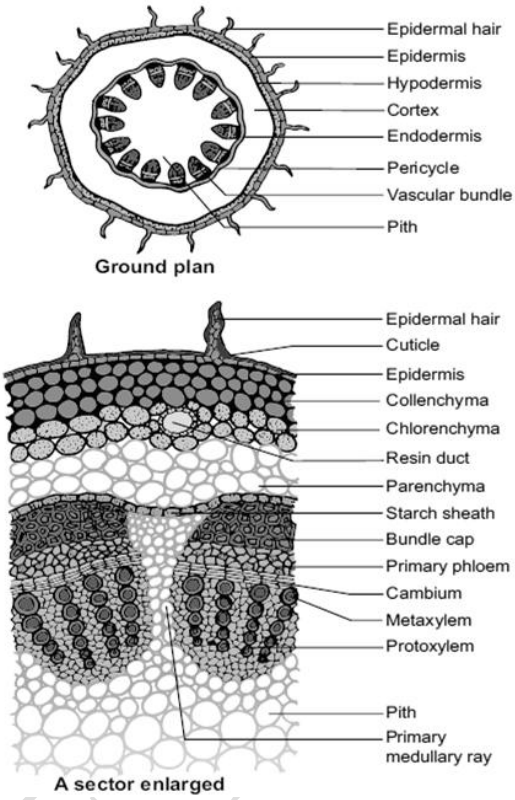
A9. Mitosis Cell division Anaphase Stage



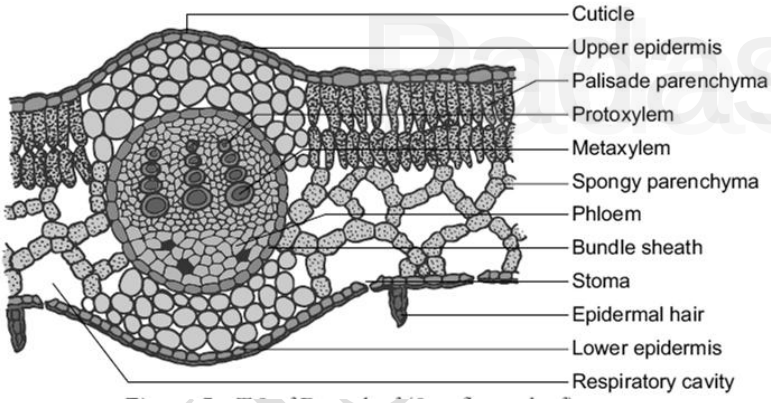
A10. Dicot Root T.S. – Bean Root



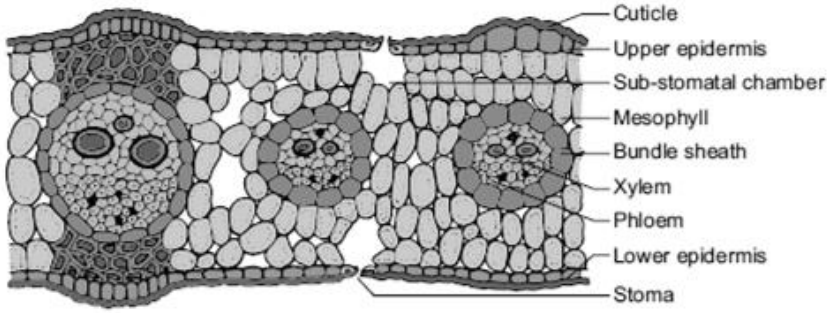
A11. Dicot Stem T.S. – Sunflower Stem



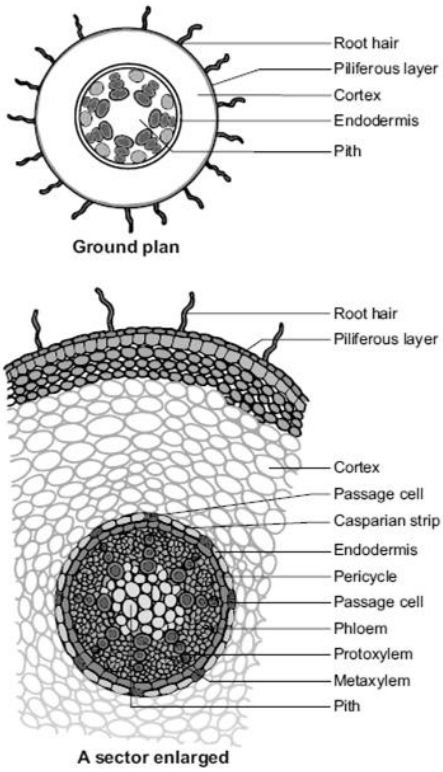
A12. Dicot Leaf T.S. – Sunflower Leaf



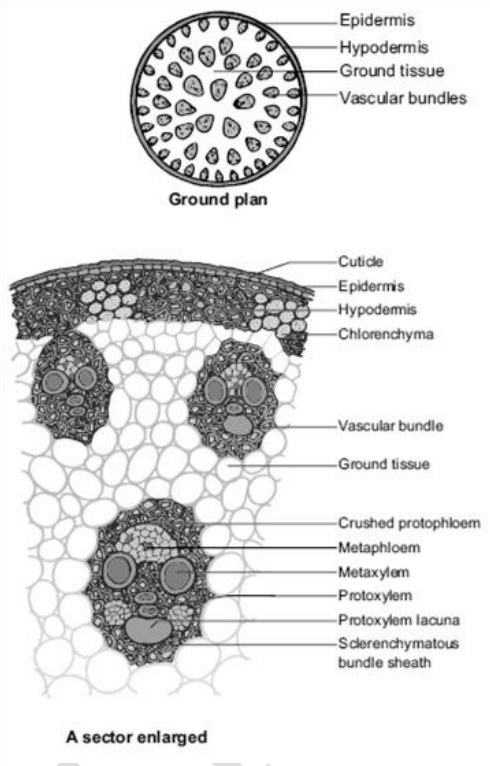
A15. Monocot Leaf T.S. – Grass Leaf



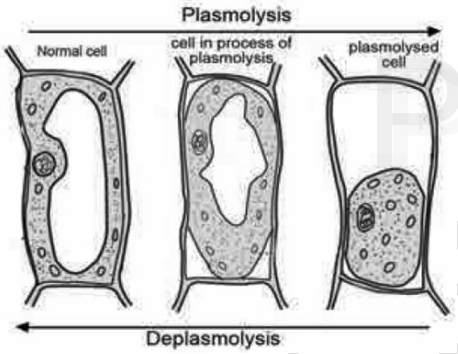
A13. Monocot Root T.S. – Maize Root



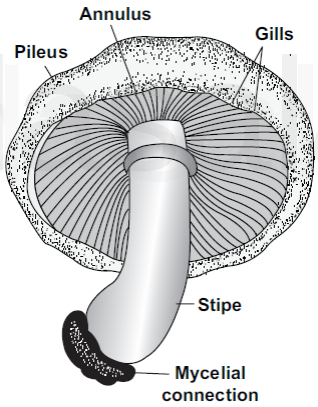
A14. Monocot Stem T.S. – Maize Stem



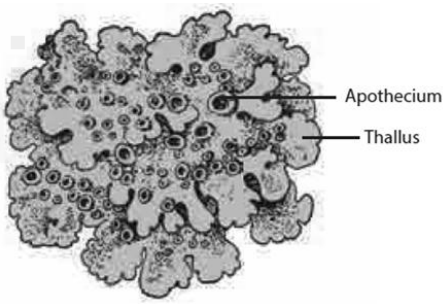
A16. Plasmolysis and Deplasmolysis



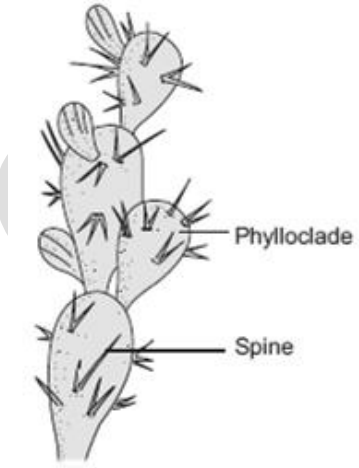
B1. Agaricus – Basidiocarp



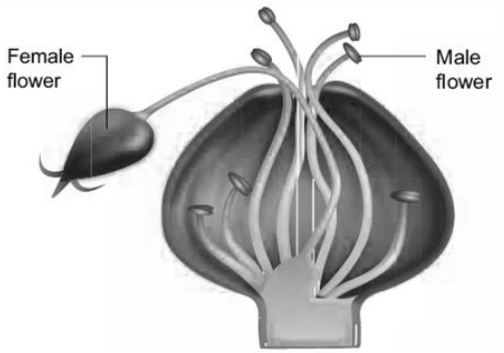
B2. Foliose Lichen



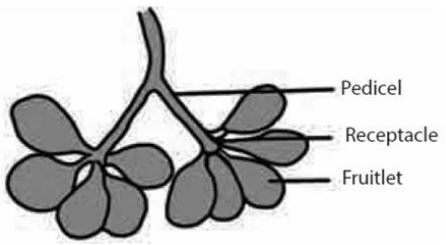
B3. Phylloclade – Opuntia



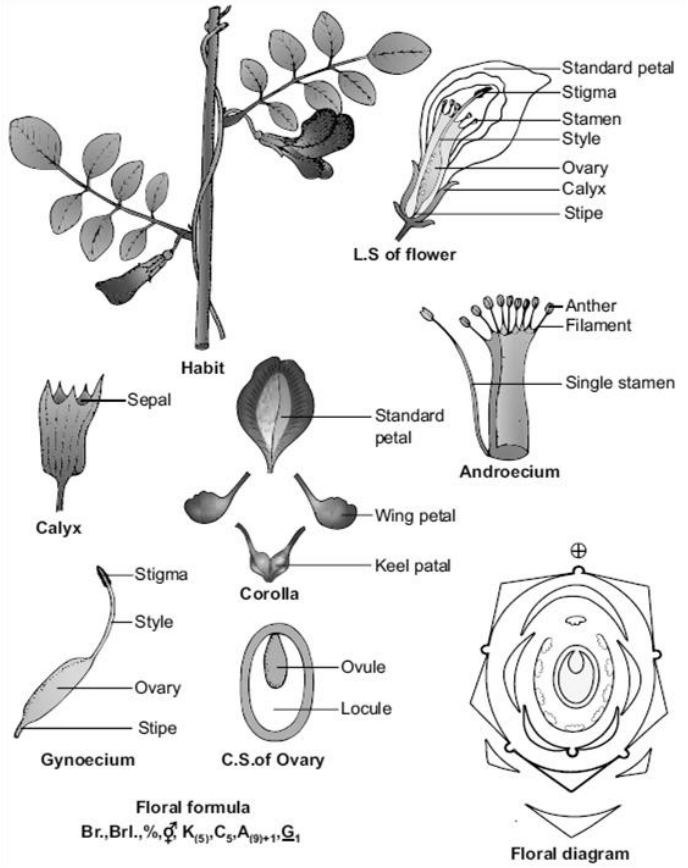
B4. Special Inflorescence – Cyathium



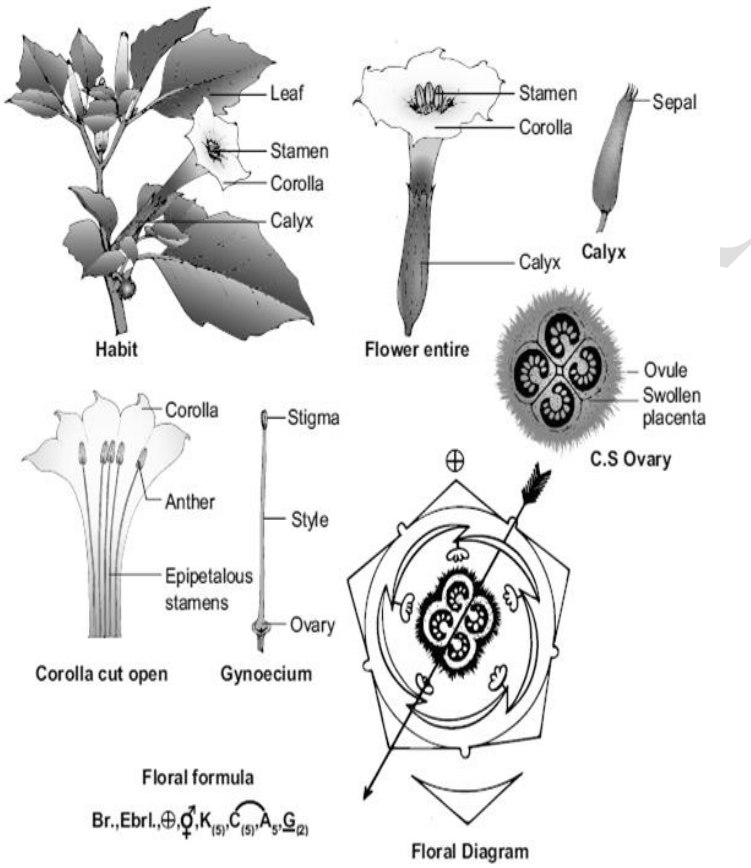
B5. Aggregate fruit - Polyalthia



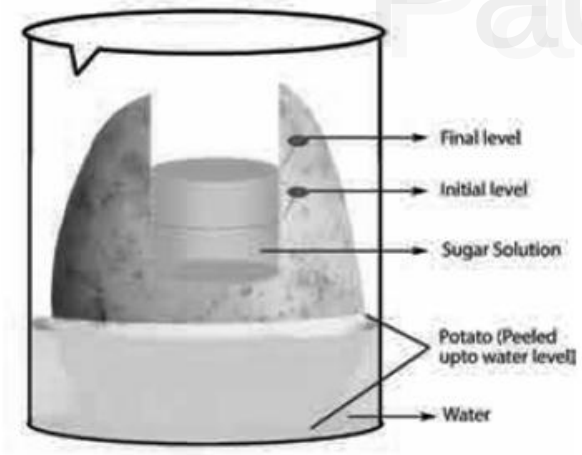
C1. Fabaceae – Clitoria ternatea



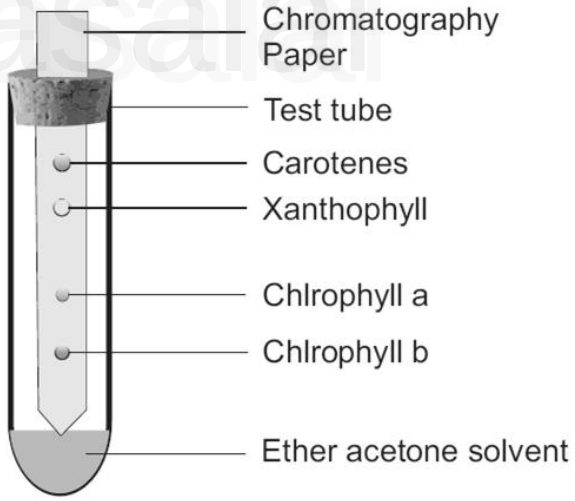
C2. Solanaceae – Datura metel



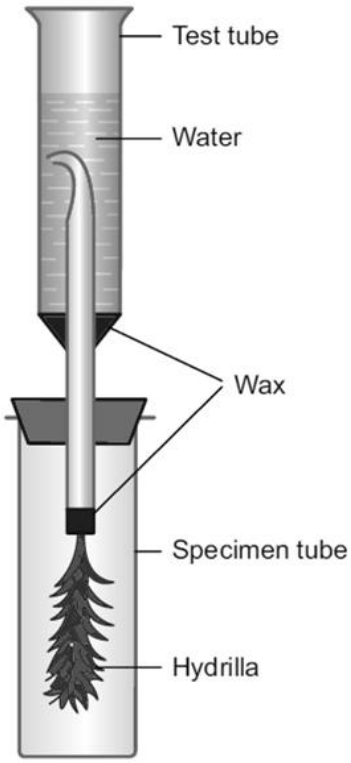
E1. Potato Osmoscope experiment



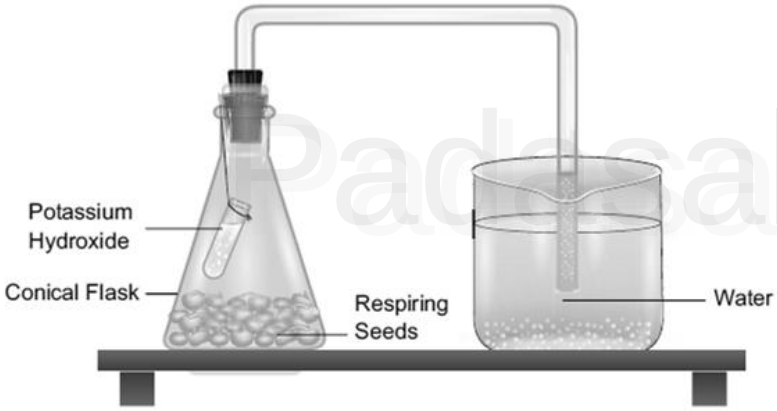
E2. Paper Chromatography experiment



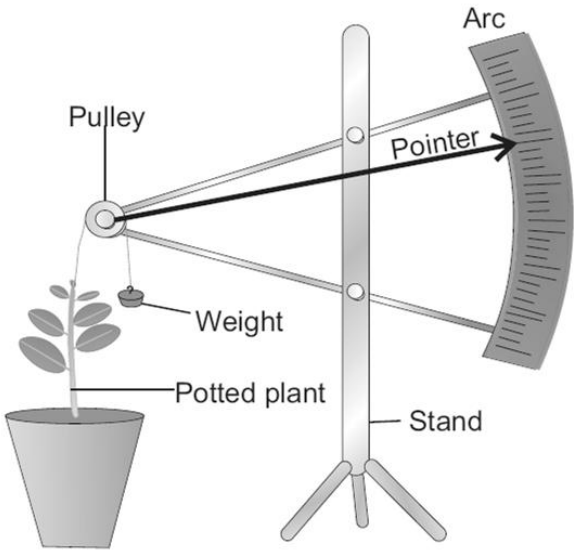
E3. Wilmott's bubbler experiment



E4. Experiment to demonstrate the production of CO_2 in aerobic respiration.



E5. Arc auxanometer experiment



****