11th STD. INSTANT SUPPLEMENTARY EXAM - JULY 2023

PART - III - BOTANY

Reg. No.

Time Allowed : 3.00 Hours] (with Answers) [Maximum Marks : 70

Instructions: (1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(2) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams.

PART - I

Note : (i) Answer **all** the questions. **(15 × 1 = 15)**

(ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

1. Match the following :

(1)	Human urine	(i)	Auxin B
(2)	Corn gram oil	(ii)	GA_3
(3)	Fungi	(iii)	Kinetin
(4)	Herring fish sperm	(iv)	Auxin A

(a) (1)-(iii), (2)-(iv), (3)-(ii), (4)-(i)
(b) (1)-(ii), (2)-(iii), (3)-(i), (4)-(iv)
(c) (1)-(iv), (2)-(i), (3)-(ii), (4)-(iii)
(d) (1)-(iii), (2)-(ii), (3)-(iv), (4)-(i)

2. Which of the following plant group has gametophyte as a dominant phase?

(a) Pteridophytes (b) Bryophytes
(c) Gymnosperms (d) Angiosperms

3. An example for zygomorphic flowers :

(a) Ceropegia (b) Thevetia
(c) Datura (d) Solanum

4. What type of transpiration is possible in the Xerophyte?

(a) Stomatal transpiration
(b) Lenticular transpiration
(c) Cuticular transpiration
(d) All the above

5. Identify the correctly matched pair.

(a) Actinomycetes - Late blight disease
(b) Mycoplasma - Lumpy jaw disease
(c) Bacteria - Crown gall disease
(d) Fungi - Sandal spike disease

6. For every CO_2 molecule entering the C_3 cycle, the number of ATP and NADPH required :

(a) 2ATP + 2NADPH
(b) 2ATP + 3NADPH
(c) 3ATP + 2NADPH
(d) 3ATP + 3NADPH

7. The compound which links glycolysis and Krebs cycle is :

(a) Succinic acid (b) Pyruvic acid
(c) Acetyl CoA (d) Citric acid

8. Bryophyllum and Dioscorea are examples for :

(a) Foliar bud, apical bud
(b) Foliar bud, cauline bud
(c) Cauline bud, apical bud
(d) Cauline bud, foliar bud

9. Gynoecium with united carpels is termed as ____

(a) Apocarpous (b) Multicarpellary
(c) Syncarpous (d) None of the above

10. Inner, darker and harder portion of secondary xylem that cannot conduct water in an older dicot stem is called :

(a) Alburnum (b) Bast
(c) Wood (d) Duramen

11. The correct sequence in cell cycle is :

(a) S - M - G_1 - G_2
(b) S - G_1 - G_2 - M
(c) G_1 - S - G_2 - M
(d) M - G_1 - G_2 -S

12. The two sub-units of ribosomes remain united at critical ion level of :

(a) Magnesium (b) Calcium
(c) Sodium (d) Ferrous

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

14. Roots are :
(a) Descending, negatively geotropic
(b) Descending, positively geotropic
(c) Ascending, positively geotropic
(d) Acending, negatively geotropic

15. Synapsis occur between :
(a) mRNA and ribosomes
(b) spindle fibres and centromeres
(c) two homologous chromosomes
(d) a male and a female gamete

Part - II

Note: Answer **any six** questions. Question No. **24** is **Compulsory**. **(6 × 2 = 12)**

16. Differentiate Oidium and Chlamydospore.

17. What is Programmed Cell Death (PCD)?

18. Write the enzymes involved in phosphorylation and dephosphorylation reactions in glycolysis or EMP pathway.

19. Mention the two characters shared by angiosperms and gymnosperms.

20. Write the floral formula for a flower with bract, without bracteole, bisexual flower and superior ovary.

21. Write short notes on G_o phase.

22. What are the parameters which control water potential?

23. The nitrogen is present in the atmosphere in huge amount but higher plants fail to utilize it. Why?

24. When you go to a timber mary to collect timber for the construction of your new house, how will you select good timber?

Part - III

Note: Answer **any six** questions. Question No. **33** is **Compulsory.** **(6 × 3 = 18)**

25. Write the distinguishing features of Monera.

26. Draw and label the parts of Transverse Section (T.S.) of Cycas rachis.

27. Differentiate between Multiple fruit and Aggregate fruit.

28. Explain the insectivorous mode of nutrition in angiosperms with one example.

29. Central part of the wood is always dark. Why?

30. Explain the structure and functions of different types of RNA.

31. Write notes about Pachytene of Prophase I.

32. Explain artificial seasoning of wood.

33. Distinguish the anatomy of dicot stem from monocot stem.

Part - IV

Note: Answer **all** the questions **(5 × 5 = 25)**

34. (a) What are the physiological effects of cytokinin.

(OR)

(b) List the classes of algae.

35. (a) How phosphorylase enzyme open the stomata in starch sugar interconversion theory?

(OR)

(b) Explain the different types of Placentation with example.

36. (a) Give the outline of the life cycle of Agaricus.

(OR)

(b) Write the characteristic features of DNA.

37. (a) Tabulate the differences between prokaryotes and eukaryotes.

(OR)

(b) What are sieve tubes? Explain.

38. (a) Write the role of nitrogenase enzyme in nitrogen fixation.

(OR)

(b) Give the floral characters of Clitoria ternatea.

Answers

PART - I

1. (c) (1)-(iv), (2)-(i), (3)-(ii), (4)-(iii)
2. (b) Bryophytes
3. (a) Ceropegia
4. (c) Cuticular transpiration
5. (c) Bacteria - Crown gall disease
6. (c) 3ATP + 2NADPH
7. (c) Acetyl CoA
8. (b) Foliar bud, cauline bud
9. (c) Syncarpous
10. (d) Duramen
11. (c) G_1 - S - G_2 - M
12. (a) Magnesium
13. (c) 42
14. (b) Descending, positively geotropic
15. (c) two homologous chromosomes

PART - II

16.

No.	Oidium	Chlamydospore
1.	The hypha divided and developed into spores are called **oidia** or **oidium**.	Thick walled resting spores are called **chlamydospores**.
2.	Produced by asexual reproduction Eg: *Erysiphe*	Produced by asexual reproduction Eg: *Fusarium*

17. 1. Senescence is controlled by plants own genetic programme and death of the plant or plant part consequent to senescence is called Programmed Cell Death.
    2. In short senescence of an individual cell is called PCD.

18. **Phosphorylation reactions in EMP pathway :**
    (i) Glucose ⟶ Glucose - 6 - Phosphate
    Enzyme : *Hexokinase*
    (ii) Fructose - 6 - Phosphate ⟶ Fructose -1, 6 - Bisphosphate
    Enzyme : *Phosphofructokinase*
    (iii) Glyceraldehyde - 3 Phosphate ⟶ 1, 3 Bisphospho Glycerate
    Enzyme : *Glyceraldehyde -3- Phosphate dehydrogenase*

    Dephosphorylation reactions :
    (i) 1,3 Bisphospho Glycerate ⟶ 3-Phospho glycerate
    Enzyme : *Phosphoglycerate Kinase*
    (ii) Phospho Enol pyruvate ⟶ Pyruvate
    Enzyme : *Pyruvate kinase.*

19. 1. Both plant groups produce seeds.
    2. Presence of Eustele
    3. Presence of well organised plant body with roots, stem and leaves.

20. Br., Ebrl., ⊕, ♀, K_5, C_5, A_5, $\underline{G}_{(5)}$.

21. 1. During interphase some cells exit G_1 and enters a quiescent stage called G_0, where the cells remain metabolically active without proliferation.
    2. Cells can exist for long periods in G_0 phase. In G_0 cells cease growth with reduced rate of RNA and protein synthesis.
    3. G_0 phase is not permanent. Mature neuron and skeletal muscle cell remain permanently in G_0.
    4. Many cells in animals remains in G_0 unless called on to proliferate by appropriate growth factors or other extracellular signals.
    5. G_0 cells are not dormant.

22. Water potential (Ψ) can be determined by,

- Solute concentration or Solute potential (Ψ_S)
- Pressure potential (Ψ_P)

By correlating two factors, water potential is written as,

$$\Psi_W = \Psi_S + \Psi_P$$

Water Potential = Solute potential + Pressure potential

a) Solute Potential (Ψ_S)

In a solution at standard atmospheric pressure, water potential is always equal to solute potential ($\Psi_W = \Psi_S$).

b) Pressure Potential (ΨP)

1. Pressure potential is a mechanical force working against the effect of solute potential.
2. Increased pressure potential will increase water potential and water enters cell and cells become turgid.

23. 1. Plants absorb minerals from the soil along with water with the help of Roots. Minerals are absorbed as salts.

2. Nitrogen is present in large quantities in the atmosphere in a gaseous form. The gaseous nitrogen must be fixed in the form of Nitrate salts in the soil to facilitate absorption by plants.

3. Nitrogen fixation can occur only by

a) Non - Biological means (Industrial processes or by lightning)

b) Biological means (Bacteria / Cyanobacteria Fungi)

Therefore higher plants cannot utilize the atmospheric Nitrogen.

24. 1. Timber is mainly used for carpentry and building houses. In order to enrich the quality of timber, seasoning of wood is done.

2. Timber is the most important tissue that sequestrates atmospheric carbon and this reduces global warming.

3. In order to enrich the quality of timber, seasoning of wood is done. Wood is characterized by colour, grain, texture and figure.

4. We must check the wood whether the wood has been gone through the seasoning. Seasoning of wood is done through by two methods.

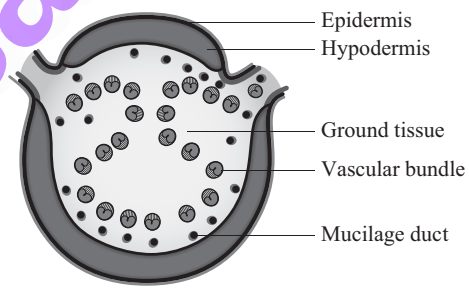
PART - III

25. 1. They are prokaryotic organisms.

2. Cell wall is present and made of peptidoglycan and mucopeptides.

3. They are mostly unicellular. Eg : Cyanobacteria, Mycoplasma.

26.



T.S. of Cycas rachis

27.

No.	Aggregate fruit	Multiple fruit
1.	It is formed from a single flower with apocarpous pistil. Each free carpel develops into a fruitlet.	It is formed from whole inflorescence.
2.	It is a group or etaerio of fruitlets.	Many fruitlets form a composite fruit.
3.	It can be compact (Annona) or loose (polyalthia).	It is Compact.
4.	Eg: Annona, Polyalthia.	Eg: Pineapple, Jack fruit.

28. Plants which are growing in nitrogen deficient areas develop insectivorous habit to resolve nitrogen deficiency.

a. ***Nepenthes* (Pitcher plant):**

Pitcher is a modified leaf and contains digestive enzymes. Rim of the pitcher is provided with nectar glands and acts as an attractive lid. When insect is trapped, proteolytic enzymes will digest the insect.

b. ***Drosera* (Sundew):**

It consists of long club shaped tentacles which secrete sticky digestive fluid which looks like a sundew.

c. ***Utricularia* (Bladder wort):**

Submerged plant in which leaf is modified into a bladder to collect insect in water.

d. ***Dionaea* (Venus fly trap):**

Leaf of this plant modified into a colourful trap. Two folds of lamina consist of sensitive trigger hairs and when insects touch the hairs it will close.

29. **1.** The centre part of the wood, which is darker in colour is called **heart wood or duramen**.

2. The sap wood conducts water while the heart wood stops conducting water.

3. As vessels of the heart wood are blocked by tyloses, water is not conducted through them.

4. Due to the presence of tyloses and their contents the heartwood becomes coloured, dead and the hardest part of the wood.

30.

Messenger RNA (mRNA)

Ribosomal RNA (rRNA)

Transfer RNA (tRNA)

Types of RNA :

I. mRNA (messenger RNA)

1. Single stranded, carries a copy of instructions for assembling amino acids into proteins.

2. It is very unstable and comprises 5% of total RNA polymer.

3. Prokaryotic mRNA (Polycistronic) carry coding sequences for many polypeptides.

4. Eukaryotic mRNA (Monocistronic) contains information for only one polypeptide.

II. tRNA (transfer RNA)

1. Translates the code from mRNA and transfers amino acids to the ribosome to build proteins.

2. It is highly folded into an elaborate 3D structure and comprises about 15% of total RNA.

3. It is also called as soluble RNA.

III. rRNA (ribosomal RNA)

1. Single stranded, metabolically stable, make up the two subunits of ribosomes.

2. It constitutes 80% of the total RNA. It is a polymer with varied length from 120 – 3000 nucleotides and gives ribosomes their shape.

3. Genes for rRNA are highly conserved and employed for phylogenetic studies.

31. Pachytene :

1. At this stage bivalent chromosomes are clearly visible as tetrads. Bivalent of meiosis I consists of 4 chromatids and 2 centromeres.

2. Synapsis is completed and recombination nodules appear at a site where crossing over takes place between non-sister chromatids of homologous chromosome.

3. Recombination of homologous chromosomes is completed by the end of the stage but the chromosomes are linked at the sites of crossing over. This is mediated by the enzyme *recombinase.*

32. 1. **Kiln seasoning** is the process in which the moisture can be removed by artificial method in an enclosed condition.

2. The timber pieces are enclosed in a steam-heater chamber into which air is introduced and circulated by fans, ensuring the removal of moisture uniformly, rapidly and completely.

33.

Anatomical differences between dicot stem and monocot stem			
No.	**Characters**	**Dicot Stem**	**Monocot Stem**
1.	Hypodermis	Collenchymatous	Sclerenchymatous
2.	Ground tissue	Differentiated into cortex, endodermis and pericycle and pith	Not differentiated, but it is a continuous mass of parenchyma.
3.	Starch Sheath	Present	Absent
4.	Medullary rays	Present	Absent
5.	Vascular bundles	(a) Collateral and open	(a) Collateral and closed
		(b) Arranged in a ring	(b) Scattered in ground tissue
		(c) Secondary growth occurs	(c) Secondary growth usually does not occur.

PART - IV

34. a)

1. Cytokinin promotes cell division in the presence of auxin (IAA).
2. It can break the dormancy of certain light-sensitive seeds like tobacco and induces seed germination.
3. It promotes the growth of lateral bud in the presence of apical bud.
4. Application of cytokinin delays the process of aging by nutrient mobilization. It is known as Richmond Lang effect.
5. Cytokinin (i) increases rate of protein synthesis (ii) induces the formation of inter-fascicular cambium, (iii) overcomes apical dominance (iv) induces formation of new leaves, chloroplast and lateral shoots.
6. Plants accumulate solutes very actively with the help of cytokinins.

(OR)

b) Algae Classes:

1. Chlorophyceae
2. Xynthophyceae
3. Chrysophyceae
4. Bacillariophyceae
5. Cryptophyceae
6. Dinophyceae
7. Chloromonadineae
8. Euglenophyceae
9. Phaeophyceae
10. Rhodophyceae
11. Cyanophyceae

35. a)

1. The discovery of enzyme phosphorylase in guard cells by Hanes (1940) greatly supports the starch-sugar interconversion theory.
2. The enzyme *phosphorylase* hydrolyses starch into sugar and high pH followed by endosmosis and the opening of stomata during light. The vice versa takes place during the night.

(OR)

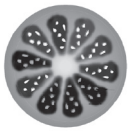
(b) The mode of distribution of placenta inside the ovary is called placentation. Placenta bears the ovules.

Different types as follows:

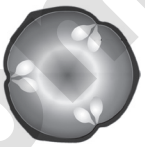
1. **Marginal:** It is with the placentae along the margin of a unicarpellate ovary. Eg: Fabaceae.

2. **Axile :** The placentae arises from the column in a compound ovary with septa. Eg: *Hibiscus,* tomato, lemon.

3. **Superficial:** Ovules arise from the surface of the septa. Eg: Nymphaeaceae.



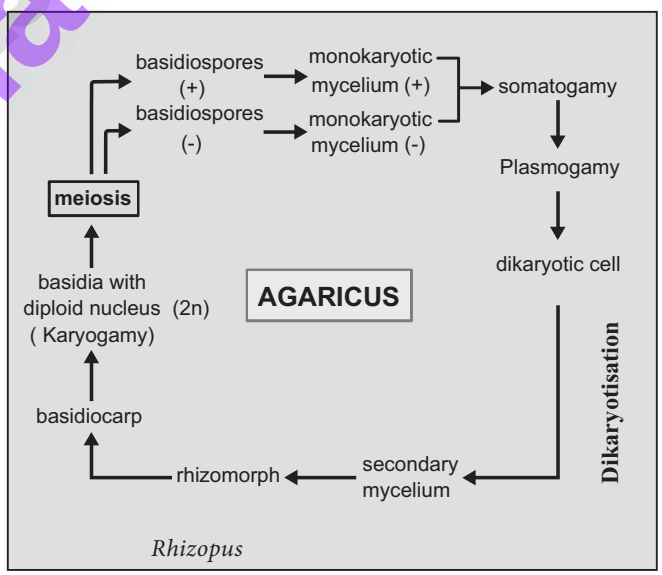
4. **Parietal:** It is the placentae on the ovary walls or upon intruding partitions of a unilocular, compound ovary. Eg: Mustard, Argemone, cucumber.



5. **Basal:** It is the placenta at the base of the ovary. Eg: Sunflower, Marigold.

6. **Free-central:** It is with the placentae along the column in a compound ovary without septa. Eg: Caryophyllaceae, Dianthus, Primrose.

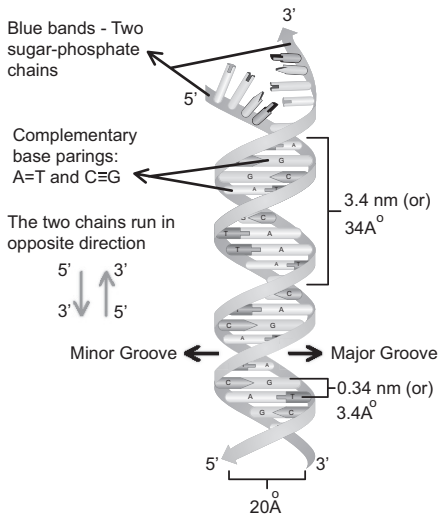
36. a)



Life Cycle of *Agaricus*

(OR)

b) Features of DNA:



1. If one strand runs in the 5'-3' direction, the other runs in 3'-5' direction and thus are antiparallel (they run in opposite direction). The 5' end has the phosphate group and 3'end has the OH group.
2. The angle at which the two sugars protrude from the base pairs is about 120°, for the narrow angle and 240° for the wide angle.
3. The narrow angle between the sugars generates a minor groove and the large angle on the other edge generates major groove.
4. Each base is 0.34 nm apart and a complete turn of the helix comprises 3.4 nm or 10 base pairs per turn in the predominant B form of DNA.
5. DNA helical structure has a diameter of 20 Å and a pitch of about 34 Å. X-ray crystal study of DNA takes a stack of about 10 bp to go completely around the helix (360°).
6. Thermodynamic stability of the helix and specificity of base pairing includes
   (i) The hydrogen bonds between the complementary bases.
   (ii) Stacking interaction between bases. Electron cloud interactions (Π – Π) between the bases.
7. The phosphodiester linkages gives an inherent polarity to the DNA helix, form strong covalent bonds, gives the strength and stability to the polynucleotide chain.
8. **Plectonemic coiling** - the two strands of the DNA are wrapped around each other in a helix, making it impossible to simply move them apart without breaking the entire structure.
9. **Paranemic coiling** - the two strands simply lie alongside one another, making them easier to pull apart.
10. Based on the helix and the distance between each turns, the DNA is of 3 forms – A-DNA, B-DNA and Z-DNA.

37. a)

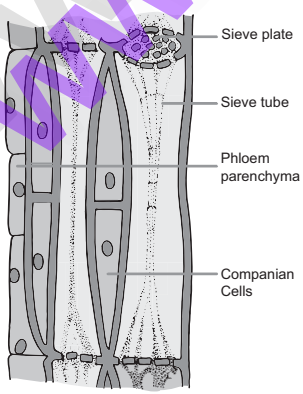
Features	Prokaryotes	Eukaryotes
Size of the cell	~1 - 5 µm	~10 - 100 µm
Nuclear character	Nucleoid, no true nucleus,	True nucleus with nuclear membrane
DNA	Usually circular without histone proteins	Usually linear with histone proteins
RNA/Protein synthesis	Couples in cytoplasm	RNA synthesis inside nucleus/ Protein synthesis in cytoplasm
Ribosomes	50S + 30S	60S + 40S
Organelles	Absent	Numerous
Cell movement	Flagella	Flagella and cilia
Organization	Usually single cell	Single, colonial and multicellular

Cell division	Binary fission	Mitosis and meiosis
Examples	Bacteria and Archaea	Fungi, plants and animals

(OR)

b) Sieve Tubes :

1. Sieve tubes are long tube like conducting elements in the phloem. These are formed from a series of cells called sieve tube elements.
2. The sieve tube elements are arranged one above the other and form vertical sieve tube.
3. The end wall contains a number of pores and it looks like a sieve. So it is called as sieve plate.
4. The sieve elements show nacreous thickenings on their lateral walls.
5. They may possess simple or compound sieve plates.
6. The function of sieve tubes are believed to be controlled by companion cells.
7. In mature sieve tube, nucleus is absent. It contains a lining layer of cytoplasm. A special protein (P. Protein = Phloem Protein) called slime body is seen in it.
8. In mature sieve tubes, the pores in the sieve plate are blocked by a substance called callose (callose plug). The conduction of food material takes place through cytoplasmic strands. Sieve tubes occur only in Angiosperms.



Different types of phloem elements

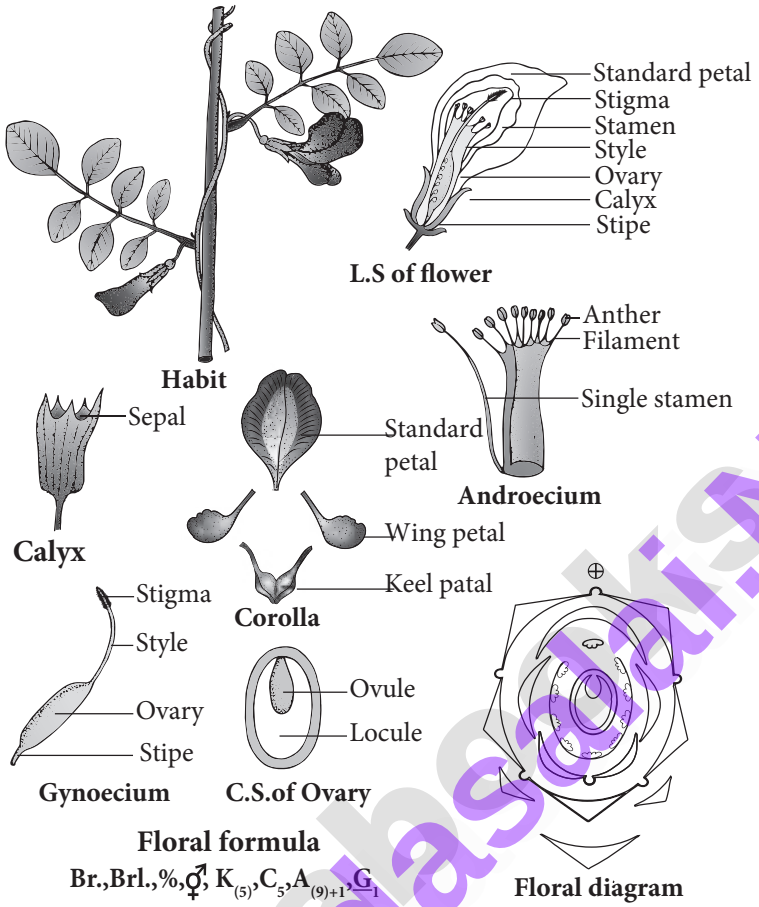
38. a)

1. Nitrogen fixation is the first step in Nitrogen cycle, during which gaseous nitrogen from the atmosphere is fixed.
2. It requires *nitrogenase* enzyme complex *Nitrogenase* is active only in anaerobic condition.
3. To create this anaerobic condition, a pigment known as leghaemoglobin is synthesized in the nodules which acts as oxygen scavenger and removes oxygen.

(OR)

b) Botanical description of Clitoria ternatea (Sangu pushpam):

1. **Inflorescence:** Solitary and axillary
2. **Flower:** Bracteate, bracteolate, bracteoles usually large, pedicellate, heterochlamydeous, complete, bisexual, pentamerous, zygomorphic and hypogynous.
3. **Calyx:** Sepals 5, synsepalous, green showing valvate aestivation. Odd sepal is anterior in position.
4. **Corolla:** Petals 5, white or blue apopetalous, irregular papilionaceous corolla showing descendingly imbricate aestivation all petals have claw at the base.
5. The outer most petal is large called standard petal or vexillum, Lateral 2 petals are lanceolate and curved. They are called wing petals or alae. Anterior two petals are partly fused and are called keel petals or carina which encloses the stamens and pistil.
6. **Androecium:** Stamens 10, diadelphous (9) + 1 nine stamens fused to form a bundle and the tenth stamen is free. Anthers are dithecous, basifixed, introse and dechiscing by longitudinal slits.
7. **Gynoecium:** Monocarpellary, unilocular, with many ovules on mariginal placentation, ovary superior, style simple and incurved with feathery stigma.
8. **Fruit:** Legume



Clitoria ternatea