Previous IPE

SOLVED PAPERS

MARCH -2019 (TS)

PREVIOUS PAPERS

IPE: MARCH-2019(TS)

Time : 3 Hours **JR.BOTANY** Max.Marks : 60

SECTION-A

I. Answer ALL the following VSAQ: **10 × 2 = 20**

1. Which is the largest botanical garden in the World? Name a few well known botanical gardens in India.
2. Who proposed five kingdom classification? How many kingdoms of this lassification contain eukaryotes?
3. Which group of plants is called vascular cryptogams? Name the branch of Botany which deals with them?
4. Name any two plants having single seeded dry fruits.
5. Differentiate actinomorphic from zygomorphic flower.
6. What is natural system of plant classification? Name the scientists who followed it?
7. An anther has 200 pollen grains. How many pollen mother cells must have been there to produce them?
8. What is the function of a polysome?
9. Glycine and Alanine are different with respect to one substituent on the α-carbon. What are the other common substituent groups?
10. Hydrophytes show reduced xylem. Why?

SECTION-B

II. Answer any SIX of the following SAQs: **6 × 4 = 24**

11. Differentiate between red algae and brown algae.
12. Give a brief account of Dinoflagellates.
13. Write briefly about the different types of ovules.
14. Describe the essential organs of Solanaceae.
15. Describe the structure of nucleus.
16. Explain prophase I of meiosis
17. State the location and function of different types of meristems.
18. What are hydrophytes? Briefly discuss the different kinds of hydrophytes with examples.

SECTION-C

III. Answer any TWO of the following LAQs: **2 × 8 = 16**

19. Explain different types of racemose inflorescences.
20. With a neat, labelled diagram, describe the parts of a mature angiosperm embryo sac. Mention the role of synergids.
21. What are complex tissues? Describe various types of complex tissues.

IPE TS MARCH-2019
ANSWERS

SECTION-A

1. Which is the largest botanical garden in the World? Name a few well known botanical gardens in India. [TS M-19]

A: 1)Royal Botanical Garden(RBG) at Kew(England) is the Largest Botanical garden in the World.

2) Well known botanical gardens in India: (i) Indian Botanical Garden, Howrah (Kolkata)
(ii) National Botanical Research Institute, Lucknow.

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2. Who proposed five kingdom classification? How many kingdoms of this classification contain eukaryotes? [TS M -19]

A. 1. R.H.Whittaker proposed five kingdom classification.

2.Four kingdoms contain eukaryotes. They are Protista, Fungi, Plantae and Animalia

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3. Which group of plants is called vascular cryptogams? Name the branch of Botany which deals with them? [AP May-19][TS M-19]

A: 1) **Pteridophytes** are called Vascular cryptogams.

2)**Pteridology** is the branch that deals with pteridophytes.

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4. Name any two plants having single seeded dry fruits. [TS M -19]

A: 1. Cashew (nut) 2. Rice (Caryopsis) 3.Tridax (Cypsela)

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5. Differentiate actinomorphic from zygomorphic flower.

[TS M-19] [TS May-17][AP M-16]

A:

Actinomorphic flower	Zygomorphic flower
1) Actinomorphic flower can be cut into two equal halves in any vertical plane.	1) Zygomorphic flower can be cut into two equal halves in one vertical plane.
2) **Ex:** Datura, Hibiscus	2) **Ex:** Bean, Pea

6. What is natural system of plant classification? Name the scientists who followed it? [TS M-19,22]

A: 1) The classification of plants on the basis of all possible Morphological characters and natural relationship is called Natural system of plant classification.

2) Bentham and Hooker, de Jussieu and de Candolle followed this system.

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7. An anther has 1200 pollen grains. How many pollen mother cells must have been there to produce them? [AP M-15,16,17][IPE- 13][TS M-17,19,20]

A: 1. 300 pollen mother cells.

2. Reason: $\frac{1}{4}(1200) = 300$

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8. What is the function of a polysome? [TS M -19][AP May-19]

A: The ribosomes of a polysome translate the mRNA into proteins.

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9. Glycine and Alanine are different with respect to one substituent on the α-carbon. What are the other common substituent groups? [TS M-19]

A: **Common substitutent groups on the α-carbon of Glycine and Alanine are:**

Hydrogen, Carboxyl group and Amino group.

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10. Hydrophytes show reduced xylem. Why? [AP M-17,20,22][TS M-15,19]

A: 1)In hydrophytes, absorption of water takes place through all over the surface of the plant body.

2)All submerged organs are capable of absorbing water. So, their xylem is reduced.

SECTION-B

11. Differentiate between red algae and brown algae. **[TS M-17,19,22][AP M-16,19]**

A:	Red Algae	Brown Algae
	1) Red algae belongs to Rhodophyceae class.	1) Brown algae belongs to Phaeophyceae class.
	2) Their red colour is due to the red pigment called r-phycoerythrin.	2) Their brown colour is due to the brown pigment fucoxanthin.
	3) Major pigments in them are chlorophyll a,d and phycoerythrin.	3) Major pigments in them are chlorophyll a,c, carotenoids and xanthophylls
	4) Reserve food material is Floridian starch.	4) Reserve food material is laminarin (or) mannitol.
	5) Asexual reproduction is by non-motile spores.	5) Asexual reproduction is by biflagellate zoospores.
	6) Sexual reproduction is by non-motile gametes. **Ex:** Gracilaeria, Gelidium	6) Sexual reproduction is by motile gametes. **Ex:** Ectocarpus, Laminaria, Fucus.

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12. Give a brief account of Dinoflagellates. **[AP M-17,19] [TS M-15,16,19,22]**

A: 1) Dinoflagellates belong to **kingdom Protista.** **[AP May-19]**

2) They are a large group of flagellate eukaryotes.

3) Dinoflagellates are seen **mostly in marine water.**

4) **Ex**: Red Dino flagellates like Gonyaulax in Medeterranian sea.

5) They appear in various colours depending upon their pigments.

6) The outer surface of their **cell wall** has **stiff cellulose.**

7) They have two flagellae, one lies longitudinally and the other lies transversely.

8) The **flagellae** produces **spinning movements**, so these are called **whirling whips.**

9) The nucleus has **condensed chromosomes.**

10) Due to absence of histones, nucleus is called **mesokaryon.**

11) Marine dinoflagellates like Noctiluca show **bioluminescence.**

12) Toxins released by dinoflagellates may harm to animal cules.

13. Write briefly about the different types of ovules. **[TS M -19]**

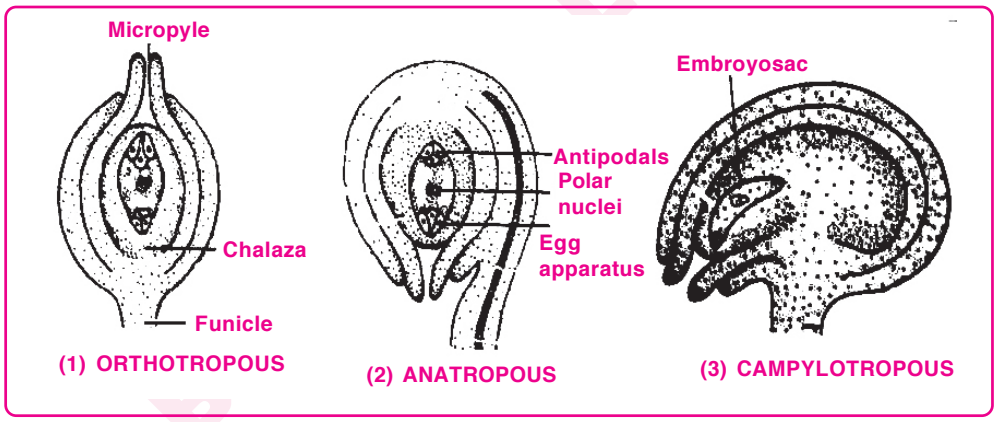
A: Ovules are 3 types.

They are 1) Orthotropous ovule 2) Anatropous ovule 3) Campylotropous ovule.

1) Orthotropus Ovule: In this type, the micropyle, chalaza and funiculus are on the same vertical line. **Ex:** Polygonum.

2) Anatropous Ovule: These are inverted ovules. The micropyle lies close to the funiculus. It results 180° curvature alongside of the funiculus. **Ex:** Sun flower family.

3) Campylotropous: The body of the ovule is placed at right angles to the funiculus. Body of the ovule bends in such a way that micropyle comes towards the funiculus. Here, the embryosac is slightly curved. **Ex:** Bean family.



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14. Describe the essential organs of Solanaceae. **[TS M-15,19,22]**

A: 1) Essential organs of Solanaceae are Androecium and Gynoecium:

2) Androecium: There are five epipetalous stamens, alternating with the petals. Anthers are dithecous, basifixed and introse.

3) Gynoecium: The ovary is superior, bicarpellary and syncarpous. It is usually bilocular but occassionally unilocular. It is oblique in position and anterior carpel to the left is at an angle of 45°. There are numerous ovules arranged on axile placentation on swollen placenta.

4) The style is terminal and **stigma is capitate.**

15. Describe the structure of nucleus. [TS M-15,19]

A: Structure of Nucleus: Nucleus has four main parts. They are

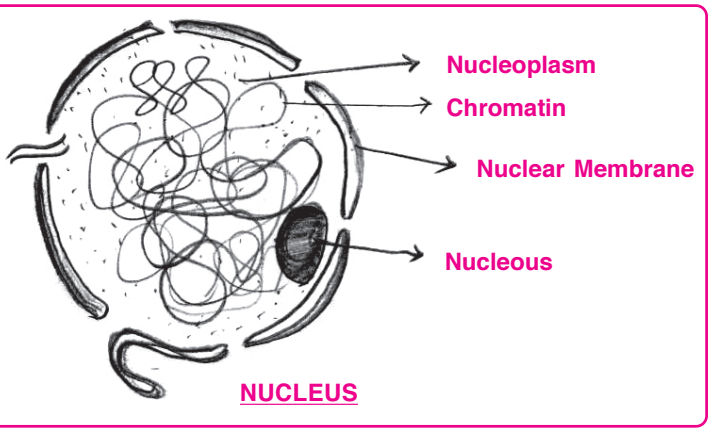
1) Nuclear envelope 2) Nuclear matrix 3) Chromatin material 4) Nucleolus

1) Nuclear envelope: It consists of two parallel membrane with nucleoplasm inside. The outer membrane is continuous with ER, which is coated by ribosomes. Minute pores are present on the membrane called nuclear pores.

2) Nucleoplasm: It is homogeneous, semi solid substance filled inside the nucleus. It is composed of glycoproteins, ribonucleo proteins, hydrolyzing enzymes, DNA and RNA polymerase.

3) Chromatin material: The darkly stained network like substance in nucleoplasm is called chromatin material. It contains DNA and histones.

4) Nucleolus: One (or) more spherical bodies present in the nucleoplasm are called nucleoli.



16. Explain prophase I of meiosis **[TS M -19][TS May-17]**

A: The Prophase I of Meiosis I is longer and more complex when compared to prophase of mitosis. It is further sub divided into 5 phases based on the chromosomal behaviour

They are 1) Leptotene 2) Zygotene 3) Pachytene 4) Diplotene 5)Diakinesis.

1) **Leptotene:** In this phase, the nucleus increases in size by absorbing water from the cytoplasm. The chromatin material organises into a constant number of chromosomes.

2) **Zygotene:** Here, the **chromosomes become shorter and thicken**. They approach each other and form pairs. This **homologous pair is called bivalent** and the **process of pairing is called synapsis.**

3) **Pachytene:** At this stage, the bivalent chromosomes are clearly visible as tetrads. This stage is characterised by the appearance of recombination nodules.

Crossing over is mediated by recombinase enzyme. Crossing over leads to recombination of genetic material.

4) **Diplotene:** Here, **dissolution of synaptonemal complex occurs**. The homologous chromosomes of **bivalents separate from each other except at the sites of cross overs.** Here, **the x-shaped structures are called chiasmata.**

5) **Diakinesis:** This is the final stage of prophase I of meiosis I. This is marked by terminalisation of chiasmata. By the end of diakinesis, the nucleolus disappears and the nuclear envelope also breaks down.

17. State the location and function of different types of meristems.[AP & TS M-17,16,15]

A: Based on the function Meristems are two types. **[TS M-19]**

I) Primary Meristems: These are formed at the primary growth of the plant.

They help in the formation of primary plant body. **[AP M-19,20]**

II) Secondary Meristems: It is formed at the secondary growth of the plant.

It helps in the wide growth of the plant.

Based on the location, Meristems are three types.

They are 1. Apical 2. Intercalary 3. Lateral Meristems.

1) Apical meristems: These are present at the growing tips of roots, stems, branches etc. They help in linear growth of the plant body. They appear early in the life of a plant and contribute to the formation of the primary plant body. So they are called primary meristems.

2) Intercalary meristems: These are found in between the permanent tissues. They are seen at the base of internodes and leaf bases of monocotyledons, particularly grasses. They are active for a short period and gradually change into permanent tissues. These are also primary meristems.

3) Lateral meristems: They are present at the lateral sides of the plant body. The cells help to increase the thickness of the organs like stem and root. It helps in the secondary growth.

Ex: Vascular cambium

18. What are hydrophytes? Briefly discuss the different kinds of hydrophytes with examples. **[AP M-16][TS M-15,17,19]**

A: Hydrophytes: Plants that grow in water are called hydrophytes.

According to their mode of living in water, these are of five kinds.

1) **Free floating hydrophytes:** These plants have no contact with soil and thus float freely on water surface. **Ex:** Pistia, Lemna, Salvinia.

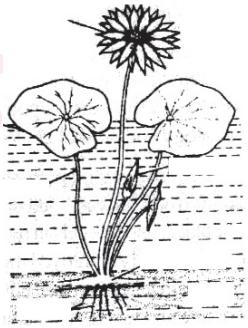
2) **Rooted hydrophytes with floating leaves:** Roots of these plants are fixed to the substratum, but their long petiolated leaves keep them floating on water surface.
Ex: Nymphaea and Victoria regia.

3) **Submerged suspended hydrophytes:** These plants have contact only with water, being completely submerged and not rooted in the mud.
Ex: Hydrilla and Utricularia.

4) **Submerged rooted hydrophytes:** These plants are completely submerged in water and attached to the substratum by their root system. **Ex:** Vallisneria.

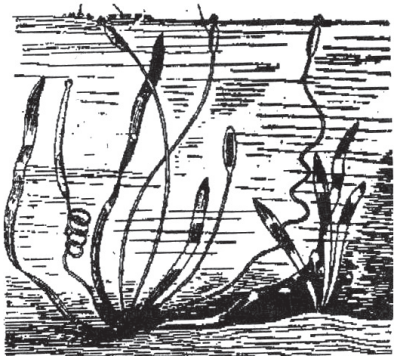
5) **Amphibious plants:** These plants live partly in water and partly in air.
Ex: Sagittaria, Typha and Limnophila.

1) Pistia

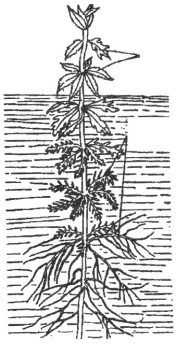


2) Nymphaea

3) Hydrilla



4) Vallisneria



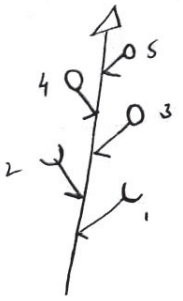
5) Limnophila

SECTION-C

19. Explain different types of racemose inflorescences. [AP M-16] [TS M-19]

A: • In simple inflorescence, the flowers grow on the Main Peduncle (Main axis). **[AP MAY-19]**

• In compound inflorescence, the flowers grow on their branches.



Simple Raceme

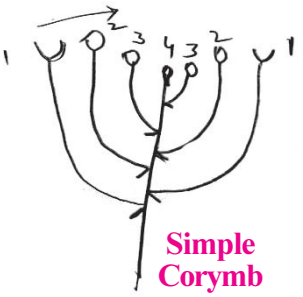
I) Types of racemose inflorescences:

1) Raceme:

i) In Raceme, the peduncle grows indefinitely .

ii) It bears several pedicellate, bracteate flowers in an acropetal succession.

Ex: Crotalaria(simple raceme), Mangifera (compound)



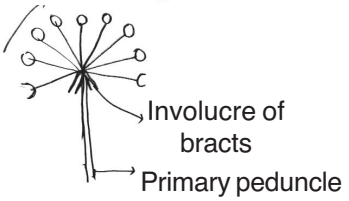
Simple Corymb

2) Corymb:

i) In Corymb, the peduncle is long. It bears many flowers in Acropetal manner

ii) All the flowers are brought to the same level even though they are borne at different nodes.

Ex: Cassia (simple Corymb), Cauliflower(Compound)



Simple Umbel

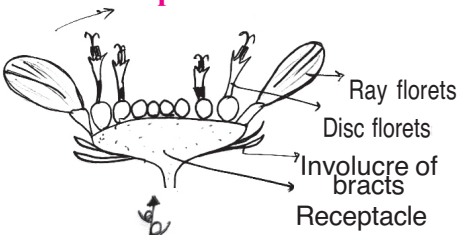
3) Umbel:

i) In Umbel, the peduncle is condensed.

ii) All the flowers appear to have arisen from the same point of the peduncle.

iii) At the base of flowers, all the bracts form a whorl.

Ex: Onion (simple umbel), Carrot (Compound Umbel)



4) Head:

i) In Head, unisexual and bisexual sessile flowers develop centripetally on a condensed peduncle.

ii) Such an arrangement of flowers is called head inflorescence.

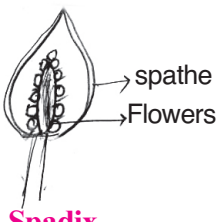
Ex: Tridax and Sunflower.


Spike

5) Spike:

i) In Spikes, the peduncle is long. It bears many sessile flowers arranged acropetally.

Ex:Achyranthes (Simple), Grass-Poaceae (Compound)



Spadix

6) Spadix:

i) In Spadix, the peduncle is fleshy and it produces many sessile, bracteate, unisexual flowers acropetally.

ii) The inflorescence is protected by a modified bract called spathe.

Ex: Colocasia (Simple Spadix), Cocos (Compound Spadix)

20. With a neat, labelled diagram, describe the parts of a mature angiosperm embryo sac. Mention the role of synergids. [TS 20,22][AP & TS M-16,17,19]

A: The mature angiosperm embryosac has three parts.
1) Egg apparatus 2) Central cell 3) Antipodals

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

2) Central cell:

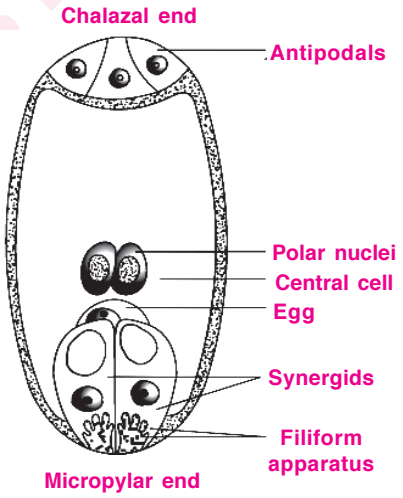
i) It is the largest cell of embryosac.
ii) It has two polar nuclei which fuse to form a single diploid secondary nucleus.

3) Antipodals:

i) Three cells present at the chalazal end of embryosac are called antipodals.
ii) These are smallest cells of embryosac.
iii) They degenerate before or after fertilisation.
iv) They are considered as vegetative cells of embryosac.

Role of Synergids:

i) Absorption of nutrients from the nucellus into the embryosac.
ii) Nourishing female gametophyte nutrients.
iii) Guiding the pollen tube into Egg cell.



MATURE EMBRYO SAC

21. What are complex tissues? Describe various types of complex tissues.[TS M -19]

A: Complex tissues: Tissues which are made up of more than one type of cells and work together as a unit are called complex tissues. They are of two types Xylem and Phloem.

I. Xylem: Xylem is the conducting tissue for water and minerals from roots to the stem and leaves. It also provides mechanical strength to the plant parts. It is composed of four different kinds of elements. They are (a) tracheids (b) vessels (c) xylem fibres (d) xylem parenchyma.

a. Tracheids: These are elongated tube like cells with thick and lignified walls and tapering ends. These are dead elements. The inner layers of cell walls have thickenings which vary in form. In flowering plants, tracheids and vessels are the main transporting elements.

b. Vessels: Vessel is a long cylindrical tube like structure made up of many cells called vessel members. Vessels are inter connected through perforations in their common walls. The presence of vessels is a characteristic feature of angiosperms.

c. Xylem fibres: They have highly thickened walls and obliterated central lumens. These may either be septate or aseptate.

d. Xylem parenchyma: The xylem parenchyma cells are living and thin walled. Their cell walls are made up of cellulose. They store food in the form of starch and fat. The radial conduction of water takes place by the ray -parenchymatous cells.

I. Xylem

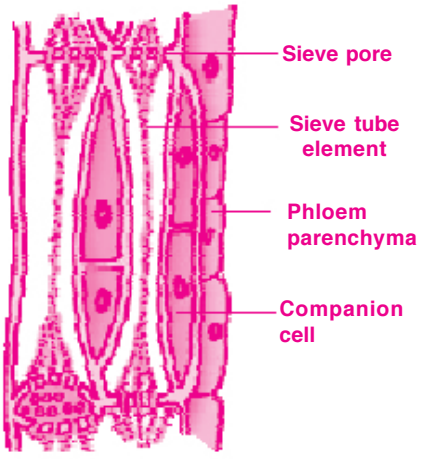
In stems, the protoxylem lies towards the centre and metaxylem lies towards the periphery of the organ. This type of xylem is called 'endarch'.

In roots, the protoxylem lies towards periphery and metaxylem lies towards the centre. This type of arrangement of primary xylem is called 'exarch'.

II. Phloem: Phloem transports food materials from the leaves to other parts of the plant. Phloem in angiosperms is composed of sieve tube elements, companion cells, phloem parenchyma and phloem fibres.

(a) Sieve Tube elements: These are long tube like structures, arranged longitudinally and are associated with companion cells. Their end walls are perforated in a sieve like manner to form sieve plates.

(b) Companion cells: The companion cells are closely associated with sieve tube element. The sieve tube elements and companion cells are connected by pit fields present between their common longitudinal walls.



II. Phloem

(c) Phloem parenchyma: It is made up of elongated, tapering cylindrical cells with dense cycloplasm and nucleus. They store food material, resin and letex.

(d) Phloem fibres (bast fibres): They are made up of sclerenchymatous cells. They are elongated, pointed and needle like. At maturity, these fibres lose their protoplasm and become dead.