

# BOTANY SYLLABUS

## UNIT-1

**Algae**-General characteristics, Classification, Organization of thallus, cell structure, Pigmentation, Reproduction, Economic Importance. Structure, Reproduction and life cycle of *Chlamydomonas*, *Oedogonium*, *Chlorella*, *Fucus*, *Volvox*, *Polysiphonia*.

**Fungi**-General characteristics, cell structure, Classification, Economic Importance, Structure, Reproduction and life cycle of *Rhizopus*, *Penicillium*, *Aspergillus*, Yeast, *Puccinia*, Heterothallism, Degeneration of sex in fungi.

**Plant Pathology**-Concept of pathogen, Mode of infection, Disease cycle, Host-parasite interaction, Causal organism, Symptoms and Control measures of Late blight of potato, Smut of Sugarcane, Rust of wheat, Citrus canker, Mosaic disease of Tobacco.

**Viruses**-General characteristics, Size and shape, Structure, Replication in TMV and Bacteriophages (Lytic and Lysogenic cycle).

**Bacteria**-Archaea- General features, Cell structure, Eubacteria-Structure, Nutrition and Reproduction (Vegetative, Asexual and Sexual), Economic importance. Cyanobacteria-General characteristics, Cell structure, Life history of *Nostoc*, *Oscillatoria*, *Spirulina*.

## UNIT-II

**Bryophyta**- General characteristics, Classification, Reproduction and Alterations of generations, Economic importance. Morphology, anatomy and Reproduction of *Riccia*, *Marchantia*, *Anthoceros* and *Spagnum*.

**Pteridophyta**-General characteristics, Classification, Reproduction and Alterations of generations. Morphology, anatomy and reproduction of *Psilotum*, *Lycopodium*, *Selaginella*, *Equisetum*, *Isoetes* and *Marsilea*, Stellar evolution, Heterospory and seed habit

**Gymnosperm**-General characteristics, morphology, anatomy and reproduction of *Cycas*, *Pinus*, *Gnetum*. Fossil and fossilization Process. Fossils :- *Cycadeoidea* and *Lyginopteris*.

## UNIT-III

**Morphology and Taxonomy of Angiosperms:** Root, stem and their modifications. Types of leaves; Venation, Phyllotaxy and modification. Inflorescence, structure of flower, Placentation, Types of fruits, Floral diagram, Floral formula. Important features of the families, Cruciferae, Fabaceae, Malvaceae, Asteraceae, Lamiales and Poaceae. Classifications: Bentham and Hooker, Hutchinson, Modern trends in botany (ICBN, Typification, Author Citation, Valid Publication).

**Anatomy:** Tissue and tissue systems, Organisation of apical meristem in root and shoot, Anatomy of typical Dicot and Monocot roots, stems and leaves. Origin of lateral root, Secondary growth, heartwood, sapwood and annual ring. Anomalous secondary growth of stem and root (*Bignonia*, *Boerhavia*, *Mirabilis*, *Nyctanthes* and *Dracena*).

#### **Embryology of Angiosperms:**

Microsporogenesis, Male gametophyte, Megasporogenesis, Female gametophyte, Pollination, Pollen- Pistil interaction, Fertilization (Double fertilization and Triple fusion) Sexual incompatibility, Development of Embryo ( Monocot and Dicot ), Apomixis, Polyembryony, Parthenogenesis. Development of Endosperm. Seed development, Types of seeds, Mechanism of seed dispersal.

### **UNIT- IV**

**Plant Physiology:** Water relations (Adsorption, Imbibition, Osmosis, Water Potential and its components), Absorption of water, ascent of sap, transpiration (mechanism of stomatal movement, factors affecting transpiration, significance), Importance and deficiency of macro and micro nutrients, Translocation of organic solutes, Phloem loading and unloading.

**Biochemistry:** Photosynthesis, Pigments, Reaction center (PSI & PSII, LHC I & LHC II) Light reaction, Cyclic and Non – Cyclic Photophosphorylation, Dark reaction, Factors affecting photosynthesis.

**Respiration:** Types, (Aerobic, Anaerobic, Fermentation). Biochemistry of Glycolysis, Krebs cycle, ETC and Oxidative phosphorylation, Photorespiration, Synthesis of ATP.

**Enzymes:** Classification, Structure and Properties. Concept of Active site (Domain & Motif), Mechanism of enzyme action, Michaelis-Menten constant, Enzyme inhibition.

**Nitrogen metabolism:** Essentiality of Nitrogen to Plants, Mechanism of Biological Nitrogen fixation, (Symbiotic & Asymbiotic), Nif gene, Assimilation of Nitrate & ammonia.

**Plant growth & growth hormones:** Concept of growth and development, Measurement of growth, growth curve. Photoperiodism, Vernalisation, Senescence, Physiological effects of Auxin, Gibberlin, Cytokinin, Absciscic acid, Ethylene. Plant movement, cause and breaking of Seed dormancy.

**Ecology:** Ecological factors, Morphological, physiological & anatomical adaptations, Hydrophytes, Halophytes, Xerophytes, Epiphytes

**Plant succession:** Concept and principle of succession, Hydrosere, Xerosere, Ecosystem-Structure and function, Food chain and food web, Ecological pyramid, Energy flow in ecosystem, Biogeochemical cycles ( Carbon, Nitrogen, Phosphorous ). Plant community & its characters.

**Environmental pollution:** Causes, effects & control measures of Soil, Water, Air & Noise pollution.

## UNIT-V

**Cell biology:** Cell theory, Structure and Function of Cell wall, Plasma membrane, Protoplasm, Mitochondria, Chloroplast, Endoplasmic reticulum, Golgi bodies, Glyoxisome, Peroxisome, Ribosome, Lysosome, Dictyosome, Sphaerosome, Vacuole, Cytoskeleton, Nucleus, Chromosome. Cell cycle & its regulation. Mitosis, Meiosis (Stages & significance).

**Molecular Biology:** DNA as the genetic material, Structure and types of DNA. Replication of DNA, types of RNA, Transcription, Post-transcriptional modification, Genetic code, Translation, Post-translational modification, Regulation of gene expression in prokaryotes & eukaryotes, Gene silencing, Transposons, DNA, RNA & Protein hybridization (Northern, Southern & Western blotting).

**Genetics:** Mendel's laws of inheritance, Gene interaction (Non – Mendelian ratio) Linkage & Crossing over, Sex determination in plants, Chromosomal aberration, Extra nuclear inheritance, Mutation Mutagenic agents, Polyploidy. Plant breeding and crop improvement.

**Evolution:** Evidences, Theory and mechanism.

**Plant biotechnology:** Plant tissue culture & techniques. Clonal Propagation, Somaclonal variation, Protoplast isolation & somatic hybridization. Pollen & Ovary culture for generation of haploid plants. R-DNA Technology, DNA Transfer (Direct & Vector mediated)

**Transgenic plants:** Agrobacterium mediated gene transfer, Importance & application of Transgenic plants in Agriculture.

**Economic botany:** Crop domestication, Importance of germplasm diversity, Origin, morphology, cultivation, processing & economic uses of Rice, Jute, Mung, bean, Potato, Groundnut, Black pepper, Tea, Rubber. Medicinal use of *Cinchona*, *Rawolfia*, *Vinca*, *Aegle* and *Embllica*.

1. The product of photosynthesis in Cyano-bacteria is generally
  - a) Glycogen
  - b) Globulin
  - c) Glucoside
  - d) Glycerophosphate
2. Algae having oil as reserve food belongs to
  - a) Chlorophyceae
  - b) Rhodophyceae
  - c) Xanthophyceae
  - d) Phaeophyceae
3. Some micro-organisms known to form nuisance water blooms in ponds, lakes and ocean belong to
  - a) Aquatic angiosperms and algal fungi
  - b) Cyanobacteria and dinoflagellates
  - c) Desmids and myxomycetes
  - d) Brown algae and red algae
4. Aflatoxins are produced by
  - a) Virus
  - b) Bacterium
  - c) Fungus
  - d) Nematode
5. The famous potato famine that occurred in Ireland in 1845 was caused by the infection of
  - a) *Alternaria solani*
  - b) Potato mosaic
  - c) Root knot nematode
  - d) *Phytophthora infestans*
6. Which one of the following belongs to the same class
  - a) *Agaricus* and *Aspergillus*
  - b) *Rhizopus* and Yeast
  - c) *Morchella* and *Saccharomyces*
  - d) *Mucor* and Yeast
7. Which of the following microorganisms is used for production of citric acid in industries?
  - a) *Lactobacillus bulgaricus*
  - b) *Penicillium citrinum*
  - c) *Aspergillus niger*
  - d) *Rhizopus nigricans*
8. The term "vascular cryptogams" is used for
  - a) Bryophyta
  - b) Pteridophyta
  - c) Angiosperms
  - d) Gymnosperms
9. The walking fern is so named because
  - a) its spores are able to walk
  - b) it propagates vegetatively by its shoot tips
  - c) it is dispersed through the agency of walking animals
  - d) it knows how to walk by itself

10. Pteridophytes differ from bryophytes in having
- Vascular tissues
  - Archegonia
  - Motile antherozoids
  - Alternation of generations
11. The haploid number of chromosomes in a gymnosperm is 12, the number in endosperm cells will be
- 12
  - 36
  - 24
  - 64
12. *Cycas* has an embryo with two cotyledons, yet it is not classified in dicots, because
- It looks like a palm
  - It has compound leaves
  - Its ovules are naked
  - It bears megasporophylls
13. In which of the following features, *Cycas* resembles with angiosperm?
- Presence of vessels
  - Circinate vernation
  - Dichotomously branched veins
  - Pollen tube is the carrier of male gametes
14. Ribbon shaped chloroplast is found in
- Ulothrix*
  - Chlamydomonas*
  - Spirogyra*
  - Chlorella*
15. Which of the following is known as “Pond’s scumb”?
- Spirogyra*
  - Ulothrix*
  - Nostoc*
  - Anabena*
16. Red colour of Red algae is due to
- r-Phycoerythrin
  - r-phycoyanin
  - carotenoids
  - xanthophylls
17. Fungal cell wall is composed of
- Chitin
  - Chitin and cellulose
  - Hemicellulose
  - Cellulose
18. Fermentation by yeast is due to
- Amylase
  - Zymase
  - Invertase
  - Galactase

19. A saprophyte which can be a parasite is called
- Facultative saprophyte
  - Obligate parasite
  - Facultative parasite
  - Obligate saprophyte
20. Infection of *Puccinia* from Barbery Plants to wheat is caused by
- Pycnidiospores
  - Aeciospores
  - Uredospores
  - Basidiospores
21. Conducting tissue in *Spagnum* is made up of
- Xylem and Phloem
  - Xylem
  - Cholenchyma
  - Parenchyma
22. Gametophytic phase is dominant in life cycle of
- Bryophytes
  - Pteridophytes
  - Gymnosperms
  - Angiosperms
23. Pteridophytes differ from bryophytes in possessing
- Spores
  - Archegonia
  - Vascular tissue
  - Alternation of generation
24. Annulus is found in
- Bryophyta
  - Pteridophyta
  - Gymnosperms
  - Angiosperms
25. In *Lycopodium* the “stele” is a
- Polystele
  - Protostele
  - Siphonostele
  - Meristele
26. The algal zone of coralloid root of cycas mostly has
- Green algae
  - Blue green algae
  - Brown algae
  - Red algae
27. Gymnosperms lack fruit because they lack
- Ovule
  - Ovary
  - Embryo
  - Seed

28. *Cycas* resembles angiosperms in having
- Ciliated sperms
  - Double fertilization
  - Vessels in stem
  - Ovule
29. Gymnosperms are dissimilar from Pteridophytes in having
- Leaf arrangement
  - Ovule
  - Gametophyte
  - None of these
30. The leaves of *Cycas* show
- Hydrophytic character
  - Xerophytic character
  - Lythophytic character
  - Mesophytic character
31. What is the genetic material of Influenza virus?
- Single stranded DNA
  - Double stranded DNA
  - Single stranded RNA
  - Double stranded RNA
32. Bacteriophages that show lysogenic cycle are called
- Temperate phages
  - Virulent phages
  - Avirulent phages
  - Lytic phages
33. Which of the following virus has a double stranded RNA?
- Lambda virus
  - Rheovirus
  - Tobacco Mosaic Virus
  - Influenza Virus
34. In which of the following plants sunken stomata are found?
- Nerium*
  - Hydrilla*
  - Mangifera*
  - Psidium*
35. Conjoint, collateral and open vascular bundles are found in a
- Dicot stem
  - Monocot stem
  - Dicot root
  - Monocot root
36. The waxy substance associated with the wall of cork cell is
- Cutin
  - Suberin
  - Lignin
  - Hemicellulose

37. Abnormal secondary growth is found in
- Dracaena*
  - Triticum*
  - Helianthus*
  - Cucurbita*
38. The healing of wounds in plants takes place by the activity of
- Apical meristem
  - Lateral meristem
  - Secondary meristem
  - Intercalary meristem
39. Presence of epicalyx and monadelphous of stamens is found in
- Liliaceae
  - Papilionaceae
  - Malvaceae
  - Solanaceae
40. What do you eat in coconut?
- Embryo
  - Mesocarp
  - Endosperm
  - Fruit wall
41. Inhibition of photosynthesis by high O<sub>2</sub> level is termed as:-
- Emerson effect
  - Warburg effect
  - Enhancement effect
  - Reduction effect
42. The substrate for photorespiration is:-
- Glyoxylate
  - Aspartate
  - Glycolate
  - Glutamate
43. Synthesis of ethylene is regulated by :-
- ACC Synthase
  - ACC Oxidase
  - Both (a) & (b)
  - None of these
44. IAA can be synthesized from:-
- Tryptophan
  - Alanine
  - Trehalose
  - Kinetin
45. The enzyme inhibition caused due to a conformational change in the enzyme is:-
- Allosteric inhibition
  - Competitive inhibition
  - None competitive inhibition
  - Feedback inhibition

46. Co-enzymes, however differ from enzymes in that:-
- They are of high molecular weight
  - They are independent of enzymes
  - They are not proteins
  - They are heat unstable
47. The aerobic oxidation of one molecule of NADH through the mitochondrial respiratory chain gives rise to:-
- 3 moles of FAD
  - 3 moles of GTP
  - 3 moles of ATP
  - 2 moles of ATP
48. The enzymes of the Krebs's cycle are located in the:-
- Matrix of the mitochondria
  - Cristae of the mitochondria
  - Outer membrane of the mitochondria
  - Chloroplast
49. DNA glycosylase involved in base excision repair, the function is:-
- Addition of correct base
  - Addition of correct nucleotide
  - Removal of incorrect base
  - Removal of phosphor di-ester bond
50. Tubulin is a protein of:-
- Cytoskeleton
  - Plasma membrane
  - Golgi body
  - Endoplasmic reticulum
51. The distortion in DNA helix due to dimer formation is called as
- Nick
  - Single stranded breaks
  - Kink
  - None of these
52. Thylakoid membrane consist of:-
- Protein
  - Lipid
  - Lipoprotein
  - Spingolipid
53. S1 nuclease digests :-
- Double stranded DNA
  - Single stranded DNA
  - Single stranded RNA
  - Hybrid DNA
54. If a DNA strand has a nitrogenous base sequence CCCGAT, what is the sequence of the complementary RNA strand?
- GGGCTA
  - GGGCUA
  - GGGCAU

- d) GGGCUU
55. What type of RNA is involved in protein synthesis?
- a) Messenger RNA
  - b) Ribosomal RNA
  - c) Transfer RNA
  - d) All of these
56. Which of the following is not associated with prokaryotic cells?
- a) Semiconservative replication
  - b) Inducible operons
  - c) Introns and exons
  - d) Lagging and leading strands
57. Rice, wheat, black gram and green gram belong to how many genera ?
- a) 04
  - b) 03
  - c) 02
  - d) 01
58. 'Red Data Book' contains the list of :
- a) Natural resources
  - b) Forests and grasslands
  - c) Endangered flora & fauna
  - d) Distributional pattern of wild life flora and fauna
59. The lowest temperature is usually observed
- a) At the time of sunset
  - b) Near midnight
  - c) Several hours before sunrise
  - d) Around sunrise
60. As the air temperature increases the air capacity for water vapour:
- a) Increases
  - b) Decreases
  - c) Remains constant
  - d) On related to air temperature
61. Pulse and Cereal crop plants belong to the families :
- a) Mimosaceae, Fabaceae
  - b) Poaceae, Mimosaceae
  - c) Malvaceae, Poaceae
  - d) Fabaceae, Poaceae
62. All of the following are suspended particles except
- a) Dust and soot.
  - b) Pesticides.
  - c) Chlorofluorocarbons.
  - d) Sulfuric acid.
63. What is the name of the gas absent in the primitive atmosphere?
- a) Nitrogen
  - b) Hydrogen
  - c) Oxygen
  - d) Methane

64. Trophic levels are formed by
- Only plants
  - Only animals
  - Only carnivores
  - Organisms linked in food chains
65. CFCs take \_\_\_\_ years to reach the stratosphere.
- 1--2
  - 5--10
  - 10--20
  - 20--30
66. To help protect the ozone layer, individuals should do all of the following except
- Avoid purchasing products that contain CFCs.
  - Buy halogen fire extinguishers.
  - Pressure legislators to ban all uses of CFCs, halons, and methyl bromide by 1995.
  - Buy new refrigerators that use vacuum insulation and helium as a coolant.
67. Chromosome having one very small arm and another long arm is called:
- Metacentric
  - Telocentric
  - Acentric
  - Acrocentric
68. Lysosome was discovered by:
- De-duve
  - Robert brown
  - Hookey
  - Robinson
69. Most abundant RNA in the cell is:
- r-RNA
  - m-RNA
  - t-RNA
  - s-RNA
70. Chromosomes with equal arm are called:
- Submetacentric
  - Metacentric
  - Telocentric
  - Acrocentric
71. Two cells are connected with the help of :
- Cell wall
  - Plasma membrane
  - Plasmodesmata
  - Vacuoles
72. Function of centrosome is:
- Cell wall formation
  - Cell plate formation
  - Cell differentiation
  - Cell division

73. Middle lamella is made up of :
- a)Suberin
  - b)Calcium pectate
  - c)Cellulose
  - d)pectin
74. Lamp brush chromosomes are seen:
- a)Mitotic prophase
  - b)Mitotic metaphase
  - c)Meiotic metaphase
  - d)Meiotic prophase
75. Heterochromatin remains condensed in which part of the chromosome:
- a)Secondary constriction
  - b)Primary constriction
  - c)Centromere
  - d)Chromomere
76. Extra nuclear DNA is found in:
- a)Ribosome
  - b)Mitochondria
  - c)Peroxisome
  - d)Vacuoles
77. Rod shaped chromosomes are called:
- a)Telocentric
  - b)Metacentric
  - c)Sub-metacentric
  - d)Acrocentric
78. Histones are
- a)Acidic proteins
  - b)Basic proteins
  - c)Mucoproteins
  - d)Glycoproteins
79. Telomeres of eukaryotic chromosome consist of ;
- a) Guanine rich lipids
  - b) Thymin rich lipids
  - c) Cytosine rich lipids
  - d) Adenine rich lipids
80. Glycogen and chitin are found in:
- a)Algae
  - b)Fungi
  - c)Diatoms
  - d)Rusts
81. The most abundant protein in the human body is:
- a)Myosin
  - b)Albumin
  - c)Collagen
  - d)Haemoglobin

82. Euchromatin is:
- a) Genetically active chromatin with genes
  - b) Stains lightly
  - c) Is partially condensed
  - d) All of these
83. Chromatin has:
- a) DNA
  - b) DNA and Proteins
  - c) DNA, RNA and proteins
  - d) None of these
84. Synthetic seed is produced by encapsulating somatic embryo with:
- a) Sodium chloride
  - b) Sodium alginate
  - c) Sodium acetate
  - d) Sodium nitrate
85. The most widely used chemical for protoplast fusion :
- a) Mannitol
  - b) Sorbitol
  - c) Mannon
  - d) Polyethylene glycol
86. Growth hormone producing apical dominance is:
- a) Auxin
  - b) Gibberellin
  - c) Ethylene
  - d) Cytokinin
87. Which of the plant cell will show totipotency:
- a) Xylem
  - b) Sieve tube
  - c) Meristem
  - d) Cork cell
88. The enzymes required to get naked protoplast are:
- a) Cellulase and proteinase
  - b) Cellulase and pectinase
  - c) Cellulase and amylase
  - d) Amylase and pectinase
89. Somatic hybridization is achieved through:
- a) Grafting
  - b) Protoplast fusion
  - c) Conjugation
  - d) R DNA technology
90. The transgenic crop was:
- a) pea
  - b) Tobacco
  - c) Flax
  - d) Cotton

91. The ability of the callus to form a whole plant is known as:
- a) Redifferentiation
  - b) Dedifferentiation
  - c) a and b
  - d) None of these
92. Golgi apparatus is often associated with:
- a) Mitochondria
  - b) RER
  - c) Chloroplast
  - d) Lysosome
93. Zone of "exclusion" is associated with
- a) Nucleus
  - b) Nucleolus
  - c) Nucleoplasm
  - d) Golgi complex
94. Golgi apparatus is absent in:
- a) Yeast
  - b) Cyanobacteria
  - c) Plant cell
  - d) Prokaryotes
95. The leucoplast which store lipids are called:
- a) Chromoplast
  - b) Amyloplast
  - c) Elaioplast
  - d) Aleuroplast
96. When a lysosome fuses with phagosome it results in formation of.
- a) Autophagic vacuole
  - b) Residual body
  - c) Secondary lysosome
  - d) Primary lysosome
97. Brownian movement is related with:
- a) Colloids
  - b) Carbohydrates
  - c) Proteins
  - d) Nucleic acid
98. Glyoxysomes are involved in:
- a) Fatty acid metabolism
  - b) Protein metabolism
  - c) Carbohydrate metabolism
  - d) None of these
99. Which of the following organelle has single membrane?
- a) Nucleus
  - b) Mitochondria
  - c) Chloroplast
  - d) Sphaerosomes

100. Peroxisomes are associated with:

- a) Photosynthesis
- b) Respiration
- c) Photorespiration
- d) Lipid metabolism

**ANSWER KEY**

1a  
2c  
3c  
4c  
5c  
6b  
7c  
8b  
9b  
10a  
11a  
12c  
13b  
14c  
15a  
16a  
17a  
18b  
19b  
20c  
21d  
22a  
23c  
24b  
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26b  
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28d  
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31c  
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40c  
41b  
42c  
43c  
44a  
45a

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89b  
90b  
91a

92b  
93d  
94b  
95c  
96c  
97a  
98a  
99d  
100c

