GONDWANA UNIVERSITY

GADCHIROLI

SEMESTER SYSTEM PATTERN SYLLABUS

for

B.Sc.

BOTANY

SEMESTER – V

(With effect from : 2014-15)

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B.Sc.

SEMESTER – V :	Paper – I	: Plant Physiology and Biochemistry	50 marks
	Paper – II	: Plant Ecology	50 marks
	Practical – I	: Based on Paper – I & II of Semester- V	30 marks
	Internal Assessment	: Based on Assignment/Seminar & Unit Test	20 marks

B.Sc.
BOTANY
SEMESTER – V
Paper – I
Plant Physiology and Biochemistry

UNIT- I :

Plant Water Relations : Properties of water, diffusion, osmosis and plasmolysis. water potential

Ascent of sap : water conduction through xylem (bulk flow hypothesis, root pressure theory, cohesion-adhesion theory)

Transpiration: Defination, types, Stomatal opening and closing mechanisms, K theory, factors affecting transpiration, significance, guttation

Phloem transport: Munch hypothesis

UNIT- II :

Mineral Nutrition : Role and deficiency symptoms of N,P,S,K,Ca,Mg,Fe,Zn,Cu,Mn,macro & micro-Nutrients,

Theories of absorption of solute in plants:

Active absorption : The Carrier Concept

Passive absorption : Ion exchange Theory and Donnan equilibrium Theory

Nitrogen Metabolism : Sources of Nitrogen to plants, Biological Nitrogen Fixation (Root Nodule Formation & Mechanism), Importance of Nitrate Reductase

UNIT- III :

Carbohydrates: Definition, properties and role, Aldoses and ketoses; structure of monosaccharides (glucose), disaccharides (sucrose), polysaccharides (cellulose and starch)

Lipids: Definition, properties and role; Structure and uses of fatty acids, oils and waxes, phospholipids, sphingolipids, sterols

Lipid metabolism: Beta- oxidation and Glyoxylate cycle

UNIT- IV :

Aminoacids : Chemical structure of amino acids, peptide bond and primary structure of protein

Basics of Enzymology : Nomenclature (IUB System), Characteristics and properties of Enzymes, Holoenzyme, Apo-enzyme, Co-enzyme, & Co-factors, Regulation of Enzyme Activity (Enzyme-Substrate Complex Theory), Mechanism of Action (Lock & Key Model, Induced Fit Model)

SEM –V

Paper – I

Plant Physiology and Biochemistry

Suggested Laboratory Exercises

Plant Physiology Experiments : (Any seven)

1. To demonstrate the phenomenon of dispersion
2. To demonstrate the phenomenon of adsorption
3. To demonstrate the phenomenon of imbibition
4. To demonstrate the root pressure
5. To demonstrate that the amount of water absorbed and the amount of water transpired is approximately equal.
6. To study the permeability of plasma membrane using different concentration of organic solvents.
7. To determine the osmotic potential of vacuolar sap by plasmolytic method
8. To compare the rate of transpiration from two surfaces of a leaf –
   By bell jar method
9. To compare the rate of transpiration from two surfaces of a leaf –
   Cobalt chloride method.
10. To determine the path of water (ascent of sap)
11. To separate amino acids from plant material by paper chromatography and their identification by comparison with standards

Plant Biochemistry Experiments : (Any three)

1. To study the enzyme activity of *Catalase* in suitable plant material as influenced by temperature
2. To study the enzyme activity of *Peroxidase* in suitable plant material as influenced by temperature
3. To study activity of Enzyme *Amylase* from germination Barley/ Wheat grains.

4. Colorimetric/ Spectrophotometric estimation of sugars and starch (Carbohydrates in suitable plant materials)
5. To prepare the standard curve of protein and determine the protein content in plant samples.

B.Sc.
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SEMESTER – V
Paper – II
Plant Ecology

UNIT-I :

Ecology : Plant and Environment, branches of ecology and significance of ecology
Climatic Factors : Atmospheric , Light , Temperature
Edaphic Factor : Pedogenesis (process), Soil profile, Soil properties (physical and chemical)
Biotic Factor : Interactions between plants and animals, Interaction between plants growing in a community, Interactions between plants and soil microorganisms.

UNIT-II :

Ecosytem : Structure, Biotic & Abiotic Components, Food chains, Food web, Ecological pyramids, elargy flow.
Biogeochemical Cycles : Water, Carbon, Nitrogen
Environmental Pollution : Air, Water and its control, definition, effects on plants.

UNIT-III :

Autecology : definition, parameters and importance, growth curve, interaction among population, ecad, ecotype- characteristics and importance
Synecology : life forms, community dynamics, study of community (analytical and synthetic characters).

UNIT-IV :

Plant succession : Definition, Causes of succession, Climax concept, Monoclimax and Polyclimax theories, Hydrosere, Xerosere.

Plant adaptations : Morphological, Anatomical & Physiological adaptations of Plant in response to Water : Hydrophytes, Xerophytes, Mesophytes, Epiphytes, Halophytes.

Phytogeography : Distribution, Botanical zones or Phytogeographic regions of India (Name, distribution area, typical vegetation)

SEM –V

Paper – II

Plant Ecology

Suggested Laboratory Exercises

Ecology Experiments :

(Note: Any Ten experiments; Experiment No. 01 is compulsory)

1. To study the ecological characters (morphological and anatomical) of the following plant. (Use permanent micro-preparations /transparencies/specimens/natural habitats for the study)
   - **Hydrophytes:** *Hydrilla, Vallisneria, Nymphaea, Potamogeton, Eichhornia,* and *Trapa* (Any four).
   - **Xerophytes:** *Acacia auriculiformis, Parkinsonia, Muehlenbeckia, Ruscus, Asparagus, Kalanchoe, Euphorbia nerifolia, Opuntia, Nerium, Casuarina*. (Any four).
   - **Halophyte :** *Rhizophora*
   - **Epiphyte :** Orchid (*Vanda*)
   - **Parasite :** *Cuscuta*
2. To determining the minimum size and number of quadrats required for reliable estimate of biomass in vegetation.

3. To study the frequency of herbaceous species in grassland and to compare the frequency distribution with Raunkiaer's Standard Frequency Diagram.
4. To estimate Importance Value Index for vegetation on the basis of relative frequency, relative density, and relative biomass.
5. To measure the vegetation cover through point-frame method.
6. To measure the above-ground plant biomass in a vegetation.
7. To determine the Kemp's constant for dicot and monocot leaves and to estimate leaf-area-index of a community.
8. To estimate bulk density and porosity of different soil samples.
9. To determine moisture content and water holding capacity of different soil samples.
10. To study the vegetation structure through profile diagram.
11. To estimate transparency, pH and temperature of different water bodies.
12. To measure dissolved oxygen content in polluted and unpolluted water samples.
13. To estimate salinity of different water samples
14. To determine the percent leaf-area-injury of different leaf samples collected around polluted and non-polluted sites.
15. To estimate dust-holding capacity of the leaves of different plant species

Schedule for Practical Examination

SEMESTER – V

Time: 5 Hours Max. Marks: 30

Q. 1 Perform given Physiology Experiment [A] & report the findings 05 Marks

Q. 2 To perform the given Biochemistry Experiment [B] & report the findings 04 Marks

Q. 3 Prepare temporary mount of the Ecological material [C] & report the findings 05 Marks

Q. 4 To perform the given Ecological Experiment [D] , draw well labelled diagrams and write about its morphological and anatomical characteristics 04 Marks

Q. 5 Spotting : 04 Marks

E - Plant Physiology
F - Biochemistry
G - Ecology (morphology)
H - Ecology (anatomy)

Q. 6)Viva Voice 03 Marks

Q. 7) Practical Record & Excursion Report 05 Marks

TOTAL MARKS – 30