M.Sc. Botany SEM-III

- 3001- **Plant Physiology**
- 3002- **Biochemistry**
- 3003- **Plant Ecology And Conservations**
- 3004- **Phytogeography, Plant For Human Welfare And Plant Breeding**
- **Practical -3005**
- **Practical-3006**

M. Sc. Botany SEM-IV

- 4001- **Economic Botany, Horticulture And Applied Botany**
- 4002- **Plant Biotechnology And Bioinformatics**
- 4003- **Genetics**
- 4004- **Angiosperm Systematic Botany**
- **Practical-4005**
- **Dissertation-4006**

Veer Narmad South Gujarat University, Surat
Syllabus for M.Sc. Semester-III
BOTANY PAPER -3001 (Plant Physiology)
(Effective from June-2019)

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Unit-I Plant water relations

- Water: 1. Sources and Functions
  2. Physicochemical properties of water
- Absorption of water and mineral
  1. Water uptake by root
  2. Xylem and phloem transport
  3. Passive and active transport
  4. The cohesion theory
- Transpiration and stomatal movements
- Role of mycorrhizaein in nutrient uptake

Unit-II Photosynthesis

- History
- Photosynthetic pigments
- Mechanism of photosynthesis
  1. Light reaction
     a. PS-I and PS-II
     b. Photo-oxidation of water
     c. Production of assimilatory powers
  2. Dark reaction
  3. C_4 Cycle
  4. CAM Cycle
- Factor affecting the rate of photosynthesis

Unit-III Respiration

- History and types
- Mechanism
  1. Glycolysis
  2. Krebs cycle
  3. ETS
- Factors affecting respiration
- Photorespiration
- Lipid metabolism in oil seeds- Glyoxylate cycle and gluconeogenesis

Unit-IV Assimilation of Inorganic nutrients

- Nitrogen metabolism
  1. Introduction
  2. Source of nitrogen
  3. Nitrogen fixation
     a. Physical
     b. Biological
     c. Biochemistry of Nitrogen fixation
- Assimilation of Sulphate
- Assimilation of Phosphate
- Assimilation of Cations
- Scope and importance of plant physiology in agriculture

Reference Books

- Lincoln Taiz, Eduardo Zeiger (2002). Plant physiology (II Edn). Sinaeur Associates, Inc. Publishers.
- Frank B Salisbury, Cleon W Ross (1992). Plant Physiology (IV Edn). Wadsworth Publishing Company.
- Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter (2002). Molecular biology of the cell (IV Edn). Garland Science, Taylor and Francis group.
- Harvey Lodish, Arnold Berk, Chris A. Kaiser, Monty Krieger, Matthew P. Scott, Anthony Bretscher,
- Hidde Ploegh, Paul Matsudaira (2007). Molecular cell biology (VI Edn). W H Freeman & Company.
- An Introduction to Plant physiology by A.K. Ganguly and N. C. Kumar; Emkay Publications
- Plant physiology by Robert M Devlin; Affiliated East–west Press Pvt Ltd.
- Text book of Plant Physiology by P. L. Kochhar and A.C. Joshi; Atma Ram and Sons
- Pant Physiology by R.C. Grewal; Campus books international
- An Introduction to Plant Physiology by W. O. James; Oxford university press.
- Plant Physiology by S. N. Pandey and B. K. Sinha; Vikas publishing house Pvt Ltd. 22
- Fundamentals of Plant Physiology by V. K. Jain; S. Chand and company ltd.
- Advance in Plant Physiology Vol I, II and III by A. Hemantaranjan; Scientific Publishers
- Plant Physiology by Salisbury and Ross; Prentice/Hall of India Pvt. Ltd.
- Physiology of plant growth and development by M. B. Wilkins; Tata McGrew-Hill
- Bewley, J.D. and Black. M. 1994 Seeds : Physiology of development and germination. Plenum Press, New Yor.
- Bendre, A. and Kumar, 2004 A. Rastogi pub. Meerut, India.
- Crocker, W. and Barton V.1953 Physiology of seeds. Waltham, Mass, U.S.A

Veer Narmad South Gujarat University, Surat
Syllabus for M.Sc. Semester-III
BOTANY PAPER -3002 (BIOCHEMISTRY)
(Effective from June-2019)

Unit I

- Carbohydrates
  1. Introduction
  2. Monosaccharide: Chemistry, Properties, Classification and Function of Monosaccharide
  3. Oligosaccharide: Chemistry, Properties and types Oligosaccharide.
  4. Polysaccharide: Chemistry and properties of homopolysaccharide: Starch and cellulose. Chemistry and properties of heteropolysaccharide:
- Lipids
  1. Classification
     a. Simple lipids
     b. Compound lipids
     c. Derived lipids
  2. Synthesis of lipids
  3. Properties of fatty acid and fats
  4. Suberin and waxes

Unit II

- Amino Acids : Classification, Properties and Structure
- Protein: Classification, Structures (Primary, Secondary, Tertiary and Quaternary) and Biological functions
- Enzymes: Introduction, Nomenclature and Classification, Physico-chemical properties, Mechanism of enzyme action, Theories of enzyme action, Factors affecting enzyme activity
- Coenzymes

Unit III

- Vitamins
  1. Classification and Properties
  2. Source, functions and deficiency symptoms of vitamins (Fat and water soluble)
- Pigments: Structure and properties of Chlorophyll, Carotenoids, Phycobillin and Anthocyanin
- Nucleic Acids: Phosphodiester Bond, Nitrogenous Bases: Purines and Pyrimidines. Modified Nitrogenous Bases, Types of DNA and Types of RNA

Unit-IV

- Alkaloids
  1. History, classifications and properties
  2. Extraction and Biosynthesis
  3. Biological role and applications
- Flavonoids
  1. Introduction and definition
  2. Subgroups and Biosynthesis
  3. Functions of flavonoids in plants
- Antibiotics
  1. Introduction and History
  2. Study of Constitution, production, synthesis and clinical properties of following antibiotics
     a. Penicillin
     b. Streptomycin
     c. Tetracycline

Reference books:

- Lea,P.U. and Leegood,R.C. 2001. Plant Biochemistry and Molecular Biology. John Wiley and Sons, New York.
- Lehninger,A.L. 2008. Principles of Biochemistry, 5th Ed. W.H. Freeman.
- Salisbury, F.B and Ross, C.W. 1992. Plant Physiology (4th Edition) Wadsworth Publishing co, USA
- Vasantha Pattabhi and Gautham,N. 2002. Biophysics. Narosa publishing House, Chennai.
- Jayaraman,J. 1981. Laboratory Manual in Biochemistry. Wiley Eastern Limited, New Delhi.

- Conn, E.E, Stumpf, P. K, Bryening, G and Doi, R. H Outlines of Biochemistry 5/E. John Wiley & Sons, New York.
- Sadasivam. S and Manikam, A.1992. Biochemical Methods for Agricultural Sciences. Wiley Eastern Ltd. New Delhi
- Bob B Buchanan, Wilhelm Gruissem, Russel L Jones (2000). *Biochemistry and molecular biology of plants*. L K International Pvt. Ltd.
- Reginald H Garrett, Charles M Grisham (2005). *Biochemistry*. Thomson Brooks/Cole
- H Robert Horton, Laurence A Moran, Raymond S Ochr, J David Rawn, K Gray Scrimgeour (2002).*Principles of Biochemistry* (III Edn). Prentice Hall.
- William H Elliott, Daphne C Elliott (2001). *Biochemistry and molecular biology* (II Edn). Oxford
- Jeremy M Berg, John L Tymoczko, Lubert Stryer, Gregory J Gatto Jr. (2007). *Biochemistry*. W H Freeman and company.
- David E Sadava (2009). *Cell biology: Organelle structure and function*. CBS
- S Sadasivam, A Manickam (1996). *Biochemical methods* (II Edn). New age international Publishers.

Veer Narmad South Gujarat University, Surat
Syllabus for M.Sc. Semester-III
BOTANY PAPER - 3003 (PLANT ECOLOGY AND CONSERVATIONS)

(Effective from June-2019)

Unit – 1. Concepts of ecosystems

- Types–Fresh water, marine and terrestrial -ecosystem
- Components of Ecosystems
- Food chain and food web
- Ecological pyramids
- Energy Flow in Ecosystem
- Development and evolution of ecosystems
- Structure and functions of Ecosystem
- Primary production
- Litter fall and decomposition
- Global biogeochemical cycle C, N, P and S

Unit -2. Plant community

- Composition and Structure of Plant Community,
- Qualitative and Quantitative Characteristics,
- Classification of communities
- Methods of study of communities-Floristic, physiognomic and phyto-sociological methods
- Ecological Succession, Process, Models and Climax Stage, of Hydrosere, Xerosere and causes of succession,

Unit-3. Ecological level

- Population ecology,
- Ecological Niche
- Autecology
- Biological clock
- Mortality,
- Natality

Biological Diversity:

- Role of biodiversity in ecosystem functions and stability;
- IUCN categories of threat
- Biodiversity hot spots
- Ecology of plant invasion
- Mapping biodiversity,
- IUCN Red data books,
- Germ-plasm banks,
- In-situ and Ex-situ conservation

Unit – 4. Conservation

- What can we do for the conservation of Ecosystem?
- Environmental Issues Climate Change:
- Greenhouse gases (CFCs, CH_4, CO_2, N_20,; sources and role);

- Ozone depletion and climate change (Global warming, CO_2 fertilization, Sea level rise, UV radiation etc.).
- Sustainable development, Bioremediation, Phytoremediation, conservation and management strategies

Reference Books

- Ambhast, R. S. (1998) A Text Book Of Plant Ecology. (9th edition),
- Barbour, M.G., Pits, W.D., and Burk, J. H. (1967) Terrestrial Plant Ecology, Addison-Wesley Publisher.
- Chapman and Reiss (2000) Ecology Principals and Application, Cambrige Uni. Press, UK
- Friend and co.5. Canter L (1996) Environmental Impact Assessment, 2nd Edition, McGraw Hill PublishingCompany.
- Jakson M L (1973) Soil Chemical Analysis, Prentice Hall of India Pvt. Ltd. New Delhi
- Kershaw, K. A. (1978) Quantitative and dynamic plant ecology, 2nd edition, EdwardArnold publication.
- Kumar, H. D. (1981) Modern concepts of ecology, (8th edition), Vikas publication.
- Mishra, R. (1968) The Ecology Work Book, Oxford and IBH public. Co., Kolkata.
- Mukherjee, B. (1996) Environmental Biology, 1st edition, Tata Mcgraw Hill.
- Mukherjee, B. (2000) Environmental Mgmt.: Basic and applied aspects ofmanagement of ecological environmental system. 1st edition. Vikas Publication House.
- Odum, E. P. (2007) Fundamentals of Ecology , 5th edition, Thomson books.
- P.D. Sharma, Ecology and Environment: Rastogi Publication
- Pandya, Puri and Singh (1968) Research Methods in Plant Ecology, Asia publishing House, New Delhi.
- Subrahmanyam and Sambamurthy (2000) Ecology, Narosa Publising House, New Delhi
- Yadav, P. R., and Mishra, S. R. (2004) Environmental biology, Discovery publication, New Delhi

Veer Narmad South Gujarat University, Surat
Syllabus for M.Sc. Semester-III
BOTANY PAPER -3004 (Phytogeography, Plant for Human Welfare and plant breeding)

(Effective from June-2019)

Unit-I Phytogeography

- Main forest types of India and their floristic composition
- Different forest of Gujarat and their vegetation
- Social forestry and Agroforestry
- Major and minor forest products of India and Gujarat

Unit-II plant for human welfare – I

- Medicinal plants: Importance of medicinal plants- role in human health care
- Traditional knowledge and utility of some common medicinal plants – *Jatropha curcus, Mentha piperita, Michelia champaca, Mucuna prurens, Oroxylum indicum, Putranjiva roxburghii, Tecomella undulata, Buchanania lanzam, Dillenia indica, Dioscorea bulbifera and Euphorbia hirta*
- Common timber yielding plants
- Insecticides from plants

Unit-III plant for human welfare – II

- Nutritive and medicinal value of some fruits and vegetables (Guava, Sapota, Orange, Mango, Banana, Lemon, Pomegranate)
- Beverages (Coffee, Tea, Chocolate)
- Common ornamental plants
- Bonsai
- General account of dyes, tannins, gums and resins

Unit-IV Plant breeding

- History and Objective of plant breeding
- Application and methods and steps' of plant breeding
- Importance of plant breeding
- Self-pollinated and cross pollinated crops.

Reference Books

- Chopra, V.L. (2001) Plant Breeding: Field Crops. Oxford IBH Pvt.Ltd. New Delhi
- Chopra, V.L. (2001) Plant Breeding: Theory and Practice. Oxford IBH Pvt.Ltd. New Delhi.
- Ecology and Environment by P. D. Sharma; Rastogi publication
- Plant Ecology and Phytogeography by V. Kumaresan; Saaras publication
- Ecology of plants by Eug Warming; Biotech Books
- Text book of Plant Ecology by R. S. Ambasht; Student' friends and co
- A text book of Plant Geography of India by Bharuch; Oxford University Press Ltd.
- Plant Geography of flowering plants by Good R; Longmans , Green and Co
- Manual of Indian Forester by Bor N. L. ; Oxford University Press
- Indigenous drugs of India by Chopra R. N. ; Manager of Publications
- Glossary of Indian Medicinal plants by Chopra R. N. ; CSIR
- Useful plants of India Pakistan by Dastur J. F.; D. B. Taraporwala sons and co. Ltd
- Vegetable Fats and Oils by Eckey E.; Reinhold Publishing corporation

- Indian medicinal Plants 3 Vol by Kirtikar , K. R. And Basu B.D.
- Directory of Economic Plants in india by Maheshwari P. And Singh U. ; ICAR New Delhi
- Economic Botany by Bendre and Kumar ; Ratogi Publications

Practical -3005 (As per paper 3001 and 3003)

- Effects of different light on rate of photo synthesis.
- Determine ioselectric point of protein.
- Thin layer chromatography.
- Estimation of Curcumin content in a given plant sample.
- Estimation of Total Alkaloid content in Tobacco leaves.
- Determine the saponification value of an Oil.
- Water analysis
  1. Determine the COD from the given water sample.
  2. Determine the BOD from the given water sample.
  3. Determine TDS from the given water sample.
  4. Determine TSS from the given water sample.
  5. Determine Oil and Grease from the given water sample.
- Soil analysis
  1. Determine pH and conductivity from the given soil sample.
  2. Determine amount Nitrogen from the given soil sample
  3. Determine amount Potassium from the given soil sample
  4. Determine amount Phosphorous from the given soil sample
  5. Determine amount Sulphate from the given soil sample
- To study different Physiological instruments.
  1. Colorimeter 2. Spectrophotometer 3. pH meter 4. Flame photometer
- To study different Ecological instruments.
  1. Sling-psichrometer 2. Soil thermometer 3. Turbidity meter 4. Anemometer
  5. Rainguage 6. Hygro-Thermograph
- Demonstration experiment of Physiology.
  1. Fermentation experiment of Kohen's .
  2. CO_2 release during aerobic respiration
  3. Compare the process of photosynthesis and respiration.
  4. Simple demonstration of 'Ascent of sap'.
  5. Determination of suction pressure developed due to transpiration pull.
  6. Determination of the rate of transpiration by simple method (Conical flask method)
- To study different types of ecological pyramids.

Practical -3006 (As per paper 3002 and 3004)

- Preparation of different kind of solutions (Normal, Molar, Percentage and ppm).
- Determination of sugar from the given sample
- Protein estimation from the given sample
- Estimation of proline from the given sample
- Estimation of Ascorbic acid from the given sample
- Total chlorophyll estimation from the sample.
- Pharamacognocy – Clove, Fennel, Cardamon, Rauwolfia and Fenugreek
- To study Fruits and vegetables and its nutritive value.
  1. Fruits- Guava, Sapota, Orange, Mango, Banana, Lemon and Pomegranate.
  2. Vegetables- Brinjal, Pea, Cabbage, Fenugreek, Tomato, Lady's finger, Bottle gourd and Cucumber
- To study Beverages.- Coffee, Tea, Chocolate
- To study Medicinal plants.- *Jatropha curcus, Mentha piperita, Michelia champaca, Mucuna prurens, Oroxylum indicum, Putranjiva roxburghii, Tecomella undulata, Buchanania lanzam, Dillenia indica, Dioscorea bulbifera and Euphorbia hirta*
- To study different Timber yielding plants.- *Accacia nilotica, Anogessus latifolia, Dalbergia latifolia, Gmelina arborea, Tectona grandis and Terminalia chrenulata*
- To study Insecticides plants.- Neem, Garlic, Chile pepper, Tomato leaf, Calotropis, Derris and Tephrosia
- Bonsai –demonstration.
- To study Dyes yielding plants.- Teak leaf, Bixa, *Indigofera tinctoria*, *Beta vulgaris*, *Butea monosperma*, *Kirganelia reticulates* and *Lawsonia alba*
- To study Narcotic plants.- Opium, Salvia, Cannabis, Tobacco and Datura