

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B.Sc. SEMESTER - III & IV
BOTANY
(Effective from June 2019)

Semester	Paper No.	Title	
III	301	Plant Physiology and Plant Ecology	
	302	Plant Anatomy, Plant Embryology and Genetics	
	303	Diversity of Gymnosperms and Angiosperms	
	Pra. 304	Practical 304	
	ID	Nutrition and Dietetics (I.D.)	
IV	401	Lower Cryptogams	
	402	Higher Cryptogams	
	403	Plant Geography, Economic Botany, Seed Plants and Plant Pathology	
	Pra. 404	Practical 404	
	ID	Biodiversity (I.D.)	

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B.Sc. SEMESTER - III
BOTANY PAPER - 301
(Effective from June 2019)

BOT 301 : Plant Physiology and Plant Ecology

Unit - I Plant Physiology I

- (A) Water Potential and Root Absorption
 - Method, path and types of root absorption
 - Factors affecting root absorption
- (B) Ascent of Sap
 - Introduction
 - Ascent of sap by xylem
 - Root pressure theory
 - Dixon's theory of Cohesion of water
- (C) Transpiration
 - Introduction
 - Types and structure of Stomata
 - Mechanism of stomatal transpiration
 - Significance of transpiration
 - Factors affecting transpiration

Unit - II Plant Physiology II

- (A) Respiration
 - Introduction
 - Types of respiration
 - Mechanism of respiration
 - (i) Glycolysis
 - (ii) Kreb's cycle
 - Oxydative phosphorylation
 - ATP synthesis in aerobic respiration
 - Factors affecting respiration

Unit - III Plant Ecology I

- (A) Ecosystem
 - Concept of Ecosystem
 - Types & Components of Ecosystem
 - Food chain, Food webs and Ecological Pyramids
 - Energy flow in ecosystem

Unit - IV Plant Ecology II

- (A) Plant communities:
 - Halophytes
 - Epiphytes
 - Lithophytes
- (B) Ecological Factors: Climatic and Edaphic factor
- (C) Soil erosion and conservation:
 - General introduction, types of soil erosion, factors responsible for soil erosion, control of soil erosion.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B.Sc. SEMESTER - III
BOTANY PAPER - 302
(Effective from June 2019)

BOT 302 : Anatomy, Embryology and Genetics

Unit - I Anatomy I

- Primary tissue structure in Roots
 - Monocot Root
 - Dicot Root
- Primary tissue structure in Stems
 - Monocot Stem
 - Dicot Stem
- Primary tissue structure in Leaf
 - Monocot Leaf
 - Dicot Leaf

Unit - II Anatomy II

- Definition and Study of normal & anomalous secondary growth seen in the following plants.
(i) Bignonia (ii) Nyctanthus (iii) Boerhaavia (iv) Dracena.

Unit - III Embryology I

- Microsporangium and Male gametophyte
 - Structure of Microsporangium, Microsporogenesis and Male Gametophyte.
- Megasporangium and Female gametophyte
 - Structure of Megasporangium, Megasporogenesis and Female Gametophyte.
- Fertilization

Unit - IV Genetics

- Heredity
 - Mendel's experiments
 - Mendel's laws of inheritance
 - Linkage and Crossing over
- Genetic material and it's Structure
 - Chemical Composition of gene
 - Nucleic Acids
 - Structure of DNA
 - Types of RNA

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B.Sc. SEMESTER - III
BOTANY PAPER - 303
(Effective from June 2019)

BOT 303 : Diversity of Gymnosperm and Angiosperms

Unit - I Gymnosperm

- Classification with reason, External Morphology, Internal Structure, Reproduction, (Except development) Male gametophyte, Female gametophyte, Fertilization, Germination of seed of following:

- (i) Pinus
- (ii) Gnetum

Unit - II Plant Structure I

- Weak stem plants
- Bracts
- Special types of inflorescence
- Fruits

Unit - III Plant Structure II

- **Pollination**
Pollination Definition, Self-pollination and Cross pollination;
Pollination in Salvia, Ficus, Orchids and Vallisneria
- Defensive devices of plants

Unit - IV Angiosperm

- Plant taxonomy : Principle of Plant taxonomy
- Classification with reasons (according to Bentham and Hooker system), general and distinguishing characters and examples (scientific name) of important plants of the following families.
 1. Brassicaceae
 2. Papilionaceae
 3. Caesalpiniaceae
 4. Mimosaceae
 5. Rubiaceae
 6. Asclepiadaceae
 7. Euphorbiaceae
 8. Pontideriaceae

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B.Sc. SEMESTER - III
BOTANY PRACTICAL - 304
(Effective from June 2019)

BOT - 304 :

- The candidates should study the typical vegetation in natural condition and should record their observation in journals. Excursion should be arranged during the year to local places.
- Every candidate shall complete laboratory course in accordance with the regulations issued from time to time by Academic Council on the recommendation of the Board of Studies.
- Every candidate shall record observation directly in the laboratory journal. Every journal shall be signed periodically. At the end of the semester candidate shall produce certified journal during the practical examination.

Practical : 1 To study Physiological experiments for demonstration.

1. To demonstrate anaerobic respiration
2. Release of CO₂ during aerobic respiration. (Conical flask method).
3. To demonstrate that energy is released in the form of heat during respiration.
4. To demonstrate the phenomenon of transpiration. (Bell-jar method)
5. Demonstration of the stomatal transpiration by four leaves method.
6. To demonstrate that water moves through the xylem.

Practical : 2 To Study principle and working method of ecological instruments.

1. Thermograph
2. Hygrograph
3. Anemometer
4. Rain gauge
5. Sling Psychrometer
6. Soil thermometer.

Practical : 3 To study ecological peculiarities of Orchid Root and Leaf.

Practical : 4 To study ecological peculiarities of Avicennia Root and Leaf.

Practical : 5 To study primary tissue structure in stem of Sunflower and Maize.

Practical : 6 To study anomalous secondary growth in Bignonia.

Practical : 7 To study anomalous secondary growth in Nyctanthus.

Practical : 8 To study anomalous secondary growth in Boerhaavia.

Practical : 9 To Study permanent slides of Anatomy.

1. Sunflower root T.S.
2. Maize root T.S.
3. Sunflower stem T.S.
4. Maize stem T.S.
5. Sunflower leaf T.S.
6. Maize leaf T.S.
7. Bignonia old stem T.S.
8. Boerhaavia old stem T.S.
9. Nyctanthus old stem T.S.
10. Dracina old stem T.S.

- Practical : 10** To Study permanent slides of Embryology.
1. T.S. of young anther
 2. T.S. of mature anther showing dehiscence
 3. Pollen tetrad
 4. Germination of pollen grain
 5. Pollinia
 6. L.S. of ovule showing megasporogenesis
- Practical : 11** (A) To study external morphology and anatomy of pinus needle (leaf).
(Preparation of slides from the fresh/Preserved material by the students)
- (B) To Study permanent slides of Pinus.
1. Pinus young stem T.S.
 2. Pinus needle T.S.
 3. Pinus male cone T.S.
 4. Pinus male cone L.S.
 5. Pinus female cone T.S.
 6. Pinus female cone L.S.
- Practical : 12** (A) To study external morphology and anatomy of Gnetum.
{Preparation of slides from the fresh/Preserved material (twig, male cone and female cones) by the students}.
- (B) To study Permanent slide of Gnetum.
1. Gnetum young stem T.S.
 2. Gnetum old stem T.S.
 3. Gnetum Leaf T.S.
 4. Gnetum male cone T.S.
 5. Gnetum male cone L.S.,
 6. Gnetum Female cone T.S.
 7. Gnetum Female cone L.S.
 8. Gnetum ovule L.S.
- Practical : 13** To study weak stem plants.
1. Creepers: Cynodon, Centella
 2. Trailers: Boerhaavia diffusa
 3. Twiners: Ipomea carica (Ipomea palmeta)
 4. Dolichos lablab
 5. Tendril climber: Passion flower, Vitis sp., Pisum Sp., Clematis, Tropeolum, Gloriosa superb, Smilax, Antigonon
 6. Root climbers: Pothos
 7. Scramblers and hook climbers: Rose, Cane, Artobotrys, Zizyphus
 8. Adhesive climber: Ficus repens
- Practical : 14** To study Bracts.
1. Foliaceous- Adhatoda
 2. Petaliod- Bougainvillia
 3. Spathy- Colocasia
 4. Involucral -Halianthus/Tridex
 5. Scaly- Halianthus/Tridex (disk florets)
 6. Cupule- Hibiscus
 7. Glumes- Maize, grass
- Practical : 15** To study special types of inflorescence.
1. Hypanthodium: Ficus
 2. Cyathium: Euphorbia
 3. Coenanthium: Doerstania
 4. Verticillaster: Ocimum

Practical : 16 To study defensive devices of plants.

1. Thorns- Carissa, Bougainvillea
2. Spines – Zizyphus, Accacia, Opuntia
3. Prickles- Rose, Smilax
4. Stinging hair- Urtica
5. Glandular hairs – Jatropha
6. Sticky latex – Euphorbia, Calotropis

Practical : 17 To Study Morphological characters, floral dissection, T.S. of Ovary and floral formulae of following families (any local plants of these family)

1. To study family Brassicaceae
2. To study family Papilionaceae
3. To study family Caesalpiniaceae
4. To study family Mimosaceae
5. To study family Rubiaceae
6. To study family Asclepiadaceae
7. To study family Euphorbiaceae
8. To study family Pontideriaceae

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B.Sc. SEMESTER - IV
BOTANY PAPER - 401
(Effective from June 2019)

BOT 401: Lower Cryptogams

Unit - I Phytoplankton and Algae

- General characters, structure and importance of Phytoplankton
- Occurrence, general characters, thallus structure, economic importance of Algae
- Outline of algal classification given by G.M. Smith

Unit - II Life history of Algae

- Classification, occurrence, thallus & cell structure and reproduction of following algal genera:
 - (i) Oscillatoria
 - (ii) Oodogonium
 - (iii) Ectocarpus
 - (iv) Batrachospermum

Unit - III Fungi

- Occurrence, general characters, vegetative structure, economic importance of Fungi.
- Outline of fungal classification given by C.J. Alexopoulos.

Unit - IV Life history of Fungi

- Classification, occurrence, vegetative structure and reproduction of following fungal genera:
 - (i) Pythium
 - (ii) Aspergillus
 - (iii) Peziza
 - (iv) Puccinia

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B.Sc. SEMESTER - IV
BOTANY PAPER - 402
(Effective from June 2019)

BOT 402 : Higher Cryptogams

Unit - I Bryophytes

- General characters
- Classification
- General account of Hepaticopsida, Anthocerotopsida and Bryopsida
- Amphibian adaptation of Bryophytes
- Economic importance of Bryophytes
- Ecological aspects of Bryophyta

Unit - II Life history of following Bryophytes

- Classification and life history of following types.(except development)
 - (i) Riccia
 - (ii) Anthoceros

Unit - III Pteridophytes

- Habit and Habitate
- General characters
- Classification
- General account of Lycopsida, Sphenopsida, Pteropsida

Unit - IV Life history of following Pteridophytes

- Classification and life history of following types.(except development)
 - (i) Equisetum
 - (ii) Marsellia
 - (iii) Sellaginella

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B.Sc. SEMESTER - IV
BOTANY PAPER - 403
(Effective from June 2019)

BOT 403: Plant Geography, Economic Botany, Seed Plants and Plant Pathology

Unit - I Plant Geography

- Minor forest products of gujarat
- Cultivation of the following crops in relation to their origin, distribution, climate, soil, propagation, method of cultivation and uses.
(i) Wheat (ii) Lady's finger (iii) Chilly (iv) Rose

Unit - II Economic Botany

- Scientific name, family, parts used and medicinal uses of the following plants.
 - i.) Tylophora indica (Dam vel)
 - ii.) Hemidesmus indicus (Anant mool)
 - iii.) Achyranthes aspera (Aghedo)
 - iv.) Mucuna pruriens (Kavach)
 - v.) Aloe barbedense (Kuvarpathu)
 - vi.) Terminalia belerica (Behda)
 - vii.) Embelica officinalis (Ambla)
 - viii.) Centella asiatica (Bhrami)
 - ix.) Helicteres isora (Marda singh)
 - x.) Santalum album (Chandan)
- Rubber and its products :
Chemical properties, tapping, grading, packing, marketing and uses

Unit - III Seed plants

- Classification with reasons (according to Bentham and Hooker system), general and distinguishing characters and examples (scientific name) of important plants of the following families.
 1. Anonaceae
 2. Rosaceae
 3. Combretaceae
 4. Myrtaceae
 5. Asteraceae
 6. Loranthaceae
 7. Liliaceae
 8. Arecaceae

Unit - IV Plant pathology

- Pathogen (Scientific name) and symptoms of following diseases
- (a) Late blight of potato
 - (b) Tikka disease of ground nut
 - (c) White rust of Crucifer
 - (d) Red stripe of Sugarcane
 - (e) Soft rot of apple
 - (f) Tobacco Mosaic Virus (TMV)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B.Sc. SEMESTER - IV
BOTANY PRACTICAL - 404
(Effective from June 2019)

BOT - 404 :

- The candidates should study the typical vegetation in natural condition and should record their observation in journals. Excursion should be arranged during the year to local places.
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- Every candidate shall record observation directly in the laboratory journal. Every journal shall be signed periodically. At the end of the semester candidate shall produce certified journal during the practical examination.

- Practical : 1 To study thallus structure and hormogonia of algae *Oscillatoria*.
(Permanent slides of *Oscillatoria* thallus W.M.)
- Practical : 2 To study thallus structure, oogonium and antheridium of algae *Oodogonium*.
(Permanent slides of *Oodogonium* thallus W.M.; oogonium and antheridium.)
- Practical : 3 To study thallus structure, unilocular and plurilocular sporangium of algae *Ecocarpus*.
(permanent slides of *Ectocarpus* thallus W.M.; Unilocular sporangium, Plurilocular sporangium.)
- Practical : 4 To study thallus structure and cystocarp of algae *Batrachospermum*.
(Permanent slides of *Batrachospermum* thallus structure; cystocarp)
- Practical : 5 To study vegetative structure of fungi *Pythium*.
(Permanent slide of *Pythium* W.M.)
- Practical : 6 To study vegetative structure of fungi *Aspergillus*.
(Permanent slide of *Aspergillus* W.M.; Conidia)
- Practical : 7 To study structure of *Peziza*.
(Permanent slide of *Peziza* Apothecia V.M.)
- Practical : 8 To study the stages on wheat leaf (Uredospore and Teleuto spore)
(Permanent slide of Uredospore, Teleuto spore, Pycnidiospores, Aecidiospores)
- Practical : 9 To study external features of gametophytes, anatomy of thallus and sporophytes of *Anthoceros*.
(Permanent slides of *Anthoceros* thallus T.S., *Anthoceros* antheredia, *Anthoceros* archegonia, *Anthoceros* sporophyte)
- Practical : 10 To study external features of gametophytes, anatomy of thallus and sporophytes of *Riccia*.
(Permanent slides of *Riccia* thallus T.S., *Riccia* sporophyte).
- Practical : 11 To study external morphology, anatomy of internode of aerial stem and cone of *Equisetum*.
(Permanent slides of *Equisetum* stem T.S., *Equisetum* cone T.S. and L.S.)

- Practical : 12 To study external morphology and anatomy of Marsellia plant with structure of spore producing organs.
(Permanent slides of Marsellia stem T.S., petiole T.S., Sporocarp T.S. and L.S.)
- Practical : 13 To study external morphology of Selaginella and anatomical characters of stem, leaf and strobilus.
(Permanent slides of Root T.S., Leaf T.S., Stem T. S. Strobilus L.S., Microsporangium L.S. and Megasporangium L.S.)
- Practical : 14 To study following minor forest products.
- i. Gum (Acacia gum)
 - ii. Bidee wrappers (Diospyros sp.)
 - iii. Fiber (Jute)
 - iv. Match box
 - v. Paper
 - vi. Dye (Bixa orellana)
 - vii. Baj (Butea monosperma)
- Practical : 15 To study Botanical name, family, origin and distribution of the following.
- i. Wheat
 - ii. Lady's finger
 - iii. Chilly
 - iv. Rose
- Practical : 16 To study Scientific name, family, parts used and medicinal uses of the following plants.
- i.) Tylophora indica (Dam vel)
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1. To study family Anonaceae
 2. To study family Rosaceae
 3. To study family Combretaceae
 4. To study family Myrtaceae
 5. To study family Asteraceae
 6. To study family Loranthaceae
 7. To study family Liliaceae
 8. To study family Arcaceae

Practical : 18 To study Pathogen (Scientific name) and symptoms of following diseases.

- (a) Late blight of potato
- (b) Tikka disease of ground nut
- (c) White rust of Crucifer
- (d) Red stripe of Sugarcane
- (e) Soft rot of apple
- (f) Tobacco Mosaic Virus (TMV)

References:

- 1. College Botany Vol. I - III Gangulee, etal. 5th Edi. 1990 New central book agency Calcute**
- 2. College Botany A. C. Datta 3rd Edi. 1989 Oxford Bombay**
- 3. Taxonomy of Angiosperms V. Singh 1st Edi. 1981 Rastogi pub.**
- 4. Cryptogamic Botany Vol. I - II G.M.Smith 2nd Edi. 1955 Tata MCGrow Hill Bombay**
- 5. Vansptishaastra (Semester II) Dr. T.G.Gohil and Dr. Alpesh B. Thakor 1st Edi. 2011 Popular prakashan, Surat**
- 6. Vansptishaastra J.V.Joshi & H.K.Patel 4th edi. 2002 Popular prakashan, Surat**
- 7. A text book of Botany vol. I (Algae, Fungi, Bacteria, Viruses, Lichen & Plant pathology) Pandey etal. - Vikash publishing House pvt. Ltd., New Delhi**
- 8. A text book of Botany vol. II (Bryophyta, Pteridophyta, Gymnosperms & Paleo Botany) Pandey etal. - Vikash publishing House pvt. Ltd., New Delhi**
- 9. A text Book of Botany paper III Dr. T.G.Gohil and Dr. Alpesh B. Thakor 1st Edi. 2007 - 2008 Popular prakashan, Surat**
- 10. A text Book of Botany for S.Y.B.Sc. semester III students by Dr. T.G.Gohil and Dr. Alpesh B. Thakor Edi. 2019 Popular prakashan, Surat**
- 11. Introduction to Fungi S.Sundara Rajan 1st Edi. 2001 Anmol Publication, New Delhi**
- 12. Botany for Degree Student- P.C. Vashishta 1st Edi.**
- 13. Modern Practical Botany Vol. II B.P. Pandey 1995 S. Chand & Company, New delhi.**
- 14. Economic Botany Albert F. Hill 2nd Edi. 1976 Tata McGRAW Hill, New Delhi**
- 15. Plant Physiology Susbeela M. Das 1st Edi. 2003 Dominant publisher, New Delhi**
- 16. Modern Practical Botany Vol. II B.P. Pandey 1995 S. Chand & Company, New delhi.**
- 17. A text book of Botany: The Algae by Brahma Prakash Pandey; Jai Prakash Nath and Co.**
- 18. A class book of Algae by G.L. Chopra; S. Hagin and Co.**
- 19. A text book on Algae by H.D. Kumar and H.S. Singh; East-west press.**
- 20. Fungi, Bacteria and Viruses by H.C. Dube; Vikas publishing house**
- 21. The fungi, bacteria and viruses by Lokendra Singh; Rastogi Publications**
- 22. Botany [for degree students] Bryophyta by B.R. vashishta; S.Chand and Co.**
- 23. Botany for degree students: Pteridophyta by P. C. Vasishta; S. Chand and Co (Pvt.) Ltd.**
- 24. Plant Physiology by Taiz and ZeigerSinauer Associates inc. publishers**
- 25. A text book of Plant Ecology R.S. Ambasht 1st Edi. 1969 Students friends & co., Varanasi**
- 26. Plant Anatomy B.P. Pandey 1st Edi 1978 S. Chand & Company, New delhi.**

27. Plant Physiology by Frank B. Salisbury.

28. Plant Pathology by R.S. Mahrotra

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30. Plant pathology R.S. Mehrotra 4th Edi. 1987 Tata McGRAW Hill, New Delhi

31. A Brief Course in Algae K.P.Saxena 1965 Prakashan Kendra, Lucknow.

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VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B.Sc. SEMESTER - III
NUTRITION AND DIETETICS (I.D.)
(Effective from June 2019)

Unit: 1 - Definition of Food, Nutrition And Nutrients.

- Function of Food, Classifications Food Groups, Importance of Food

Group and Nutritive Value of Food Groups. (i) Cereals, (ii) Pulses (iii) Fruits and Vegetables (iv) Milk (v) Sugar And Jaggery (vi) Fats and Oil.

- Concept of Balance Diet, use of food group in planning balance diet.

- Use of recommended dietary intake (RDIs) in planning balance diet, factors affecting RDIs.

Unit: 2

Macronutrients:

-Carbohydrate: Definition, sources, functions and deficiency symptoms.

-Protein: Definition, sources, functions and deficiency symptoms.

-Fat and lipids: Definition, sources, functions and deficiency symptoms.

Micronutrients:

-Vitamins: Definition, sources, functions and deficiency symptoms.

- Minerals: Definition, sources, functions and deficiency symptoms.

- Water: As a nutrient, requirements, and functions

Unit: 3 Food preservation -Introduction and Definition

-Importance and Principles of food preservation

-Methods for food preservation -Food spoilage.

Unit: 4 Meal planning Definition and principles

- Factors to be considered in meal planning,

- meal planning for School children, teen age and during travel,

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR B.Sc. SEMESTER - IV
BIODIVERSITY (I.D.)
(Effective from June 2019)

Unit-1. - Introduction and scope of biodiversity.

- Importance and values of biodiversity.

Unit-2 - General pattern of vegetation of Gujarat.

- Deciduous forest. - Scrub forest
- Vegetation of ponds and ditches.
- Vegetation of river bank.
- Vegetation along Sea shore and saline ground.

Unit-3. - Conservation of biodiversity.

- Endangered, endemic, threatened and rare species of Gujarat and efforts for its conservation.

Unit-4. - Biodiversity of flora, fauna, mangroves and medicinal Plants of Gujarat.

- In-situ & Ex-situ conservation
- Biodiversity act.
- Biological hot-spots.