B. Sc.

Botany	
Program Out Come	Botany is the study of plants as a science. It entails investigating their structure, how they grow, how they may be successfully classified, and the factors that influence their development, among other things. Botany is a field of biology concerned with the study of all living things. Students with a B.Sc. in Botany will be able to: -Recognise cryptogamic plants. -Apply nursery management knowledge to the proliferation of economically important plants; - Identify and use some basic therapeutic plants -Produce some basic food crops -Recognise and control plant diseases; -Recognise and control weed plants -Recognise and control phanerogamic plants
Programe Specific Outcome	-Students learn about the strategies employed in the production of industrially relevant plant products. -Students gain conceptual knowledge of entrepreneurship in mushroom farming, the manufacturing of bio-fertilizers and bio-pesticides, fermentation, and other areas. -Recognize the diversity of plants and their structural organisation, such as monocots and dicots; -Learn about plant structures in relation to their physiological and metabolic processes.

B.Sc. SEMESTER - I BOTANY

PAPER - 101

(Effective from June 2018)

BOT – 101 : PLANT DIVERSITY

Unit - I **Introduction to Plant Diversity**

- Concept, Plant Kingdom(Eichler system)- cryptogams and phanerogams, diversity in plant kingdom, position of plants in five kingdom system.
- Prokaryotic and Eukaryotic cell structure

Unit - II **Microbes**

- Bacteria : Discovery, general character, structure and importance
- Virus: Discovery, general character, structure and importance

Unit - III **Algal diversity**

- Occurrence, classification, thallus, cell structure, pigments, reserve food material and reproduction of *Nostoc* and *Spirogyra*

Unit - IV **Fungal diversity**

- Occurrence, classification, thallus, cell structure, nutrition and reproduction of *Mucor* and *Agaricus*

Unit - V **Lichen**

- Classification, general characters, external and internal characters, reproduction and economic importance of *Lichen*

B.Sc. SEMESTER - I BOTANY PAPER - 102

(Effective from June 2018)

BOT - 102 : PLANT DIVERSITY, NURSERY MANAGEMENT AND UTILIZATION

Unit - I **Bryophytes**

- Study of life history, occurrence, thallus structure, reproduction and sporophyte diversity (external and internal) of *Funaria*.

Unit - II **Pteridophytes**

- Study of life history, sporophyte, gametophyte (external and internal) and reproduction of *Nephrolepis*.

Unit - III **Nursery Management**

- Introduction, types of nurseries
- Plant propagation- cutting, budding, grafting and layering
- Fertilizer and pesticides
- Methods of irrigation: drip and sprinkler,

Unit - IV **Plant Morphology**

- **Root:** Definition, parts of root, types of root, functions and modification of root.
- **Stem:** Definition, characters of stem, shape and surface of stem, types of stem, functions & modification of stem,
- **Leaf:** Definition, characters & parts of leaf, types of stipules, venation, types of leaf, functions and modification of leaf.
- **Flower:** Definition, structure of typical flower, arrangement of floral leaf, types of flower.

Unit - V **Food plants**

- Cultivation of the following crops in relation to their origin, distribution, climate, soil, propagation, method of cultivation and uses.
- Sugar cane, Paddy, Mango, Brinjal

B.Sc. SEMESTER - IBOTANY
PRACTICAL - 103
(Effective from June 2018)

BOT - 103 : PLANT DIVERSITY, NURSERY MANAGEMENT AND UTILIZATION

- 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 T0 study microscopic examination of curd.

Permanent slides of Bacteria

Chart/Specimen of different types of Virus.

Practical :2 **Nostoc:**

To study thallus structure and akinets in Nostoc.

Practical :3 **Spirogyra:**
To study the thallus structure, Scalariform conjugation and Lateral conjugationin Spirogyra.
(Permanent slides of thallus W.M, Scalariform conjugation, Lateral Conjugation.)

Practical :4 **Mucor :**
To study the thallus structure and reproductive structure.
Permanent slides of Mucor vegetative W.M., Mucor sporangia, MucorZygospore.

Practical :5 **Agaricus:**
To study the vegetative structure, basidiocarp, gills, basidia and basidiospores.
Permanent slides : Stipe T.S.; Pileus T.S.

Practical :6 **Lichen:**
To study external features and internal structures of Usnea
(Permanent slides of Lichen thallus T.S., Lichen apothecium V.S., Lichen soridia)

Practical :7 **Moss (Funaria):**
To study the external features of gametophyte and sporophyte.
(Permanent slides of Funaria antheridia W.M.; Funaria archegonia W.M.)

Practical :8 **Nephrolepis :**
Preparation of slides from the fresh material of T.S of Stolon & T.S. of Rachis by the students.
(Permanent slides: T.S. of Stolon, T.S. of Rachis, T.S. of leaflet passing through sori, Nephrolepisprothallus, Fern sori W.M.,prothallus with antheridia, prothallus with archegonia, prothallus with sporophyte.)

Practical :9 **Nursery Management**

i) Study of methods of propagation with the help of suitable materials - tubers, bulbs, rhizomes, corms, suckers and runners.

ii) Propagation of horticultural plants by stem cuttings, air layering, grafting and 'T' budding.

Practical :10 **Roots:**

- To study different types of roots:
  - Tap root- *Vinca*
  - Fibrous- *Grass*
  - Advantitious- *Sugarcane*
- To study modification of root:
  - Prop root- *Banyan tree*
  - Stilt root- *Maize*
  - Pneumatophores- *Avicennia*
  - Storage root- *Carrot, sweet potato*

Practical :11 To study different types of stem

- To study Aerial stem
  - Cudex-*Palms*,
  - Clum-*Bamboo*,
  - Scape- *Canna and Onion*
  - Excurrent- *Polyalthialongifolia, Casurina*
  - Deliquescent- *Mango*
  - Weak stem: *Ipomoea*
- To study underground stem
  - Rhizome- *Ginger, Turmeric*
  - Tuber- *Potato*
  - Bulb- *Onion*
  - Corm- *Amorphophollus*
- To study Specialized stem
  - Phylloclade- *Opuntia*
  - Cladode- *Asparagus*

Practical :12 Leaf:

- To study different types of leaf:
  - Simple leaf: Banyan, *Mango*
  - Pinnate Compound Leaf:
    - ✓ Unipinnate: *Cassia, Rose*
    - ✓ Bipinnate: *Mimosa, Caesalpinia*
    - ✓ Tripinnate:*Moringa*
    - ✓ Decompound: *Coriander*
  - Palmately Compound Leaf
    - ✓ Unifoliote: *Citrus*
    - ✓ Bifoliate: *Balanites, Bauhinia*
    - ✓ Trifoliate: *Crotalaria, Oxalis*
    - ✓ Quadrifoliate: *Marsilea*
    - ✓ Multifoliate: *Bombax*

Practical :13 Flower:

- To study different types of flower:
  - Regular flower: *Ipomoea*
  - Irregular flower: *Clitoria, Caesalpinia*
  - Unisexual flower: *Coccinia*
  - Bisexual flower: *Hibiscus*

Practical :14 Botanical name, family, origin, distribution and uses of the followingcrops.

- *Sugarcane*
- *Paddy*
- *Mango*
- *Sapota(Chikoo)*
- *Brinjal*
- *Tomato*

B.Sc. SEMESTER - IIBOTANY PAPER - 201

(Effective from June 2018)

BOT - 201 :PLANT PHYSIOLOGY, PLANT ECOLOGY, PLANT ANATOMY, MEDICINAL PLANTS AND PLANT PATHOLOGY

Unit - I **Plant Physiology**

- Imbibition and Osmosis
- Plant Movement: Definition and types of movements
- Photosynthesis: Definition, pigments, light and dark reaction, C_3 and C_4 cycle, factors affecting photosynthesis

Unit - II **Plant Ecology**

- Ecological adaptations, morphological and anatomical characters of Hydrophytes, Mesophytes and Xerophytes with appropriate examples

Unit - III **Plant Anatomy**

- Tissue system: Meristematic and Permanent tissue
- Vascular Bundle: Definition and types
- Stele: Definition and types
- Ergastic matters: starch grain, raphides, sphaerephides, aleurone grain and cystolith

Unit - IV **Medicinal Plants**

- Scientific name, family, part use and medicinal uses of following:
  - *Ocimum sanctum*
  - *Adhatodavasica*
  - *Aloe barbedense*
  - *Azadirachtaindica*
  - *Abrusprecatorius*
  - *Zingiberofficinale*

Unit - V **Plant Pathology**

- Causal organisms, symptoms and control measures of the following plant diseases:
  - Leaf spot of Mango
  - Red rot of Sugarcane
  - Bacterial blight of Paddy
  - Little leaf of Brinjal
  - Citrus canker

B.Sc. SEMESTER - IIBOTANY PAPER - 202

(Effective from June 2018)

BOT - 202 :PLANT DIVERSITY AND WEED MANAGEMENT

Unit - I **Weed management**

- Introduction
- Invasive weeds: concept and causes of their dominance
- Weed control: Physical, chemical and biological methods
- Sustainable use of weeds

Unit - II **Gymnosperm**

- Classification, external morphology, internal structure, reproduction and alternation of generation in Cycas.

Unit - III **Morphology**

- Phyllotaxy: Definition and Types with examples.
- Aestivation: Definition and types with examples
- Inflorescence: Definition and Types: Racemose and Cymose
- Placentation: Definition and Types with examples.

Unit - IV **ANGIOSPERMS**

- Classification as per Bentham & Hooker's system of Classification, general characters, economic and medicinal importance, Botanical name of common important plants of the following families.
  - Malvaceae
  - Apocynaceae
  - Convolvulaceae
  - Nyctaginaceae
  - Amarillidaceae

Unit - V **Conservation of plant diversity**

- Concept and need, Methods of in-situ and Ex-situ conservation
- Botanical garden
- Forests: Importance of forests and their conservation.

B.Sc. SEMESTER - IIBOTANY

PRACTICAL - 203

(Effective from June 2018)

BOT - 203 :PLANT PHYSIOLOGY, PLANT ECOLOGY, PLANT ANATOMY, MEDICINAL PLANTS AND PLANT PATHOLOGY, PLANT DIVERSITY AND WEED MANAGEMENT

- 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 **Plant physiology** (Experiment to be demonstrated)

- (i) Imbibition and Imbibition force
  - Test tube experiment.
  - Indicator experiment
- (ii) Plant movements
  - Geotropism
  - Phototropism
  - Hydrotropism
- (iii) Photosynthesis
  - Mohl's half leaf experiment
  - Light is necessary for photosynthesis

Practical :2 **Plant ecology** (Fresh specimens to be shown to the students):

- Hydrophytes:
  - Hydrilla, Vallisneria, Eichhornia, Pistia, Nymphaea, Marsilea.
- Mesophytes:
  - Coriander, Trigonella, Garlic (Entire plants)
- Xerophytes:
  - Solanum xanthocarpum, Casuarina, Aloe vera, Opuntia, Euphorbia tiruculli

Practical :3 **Tissue:** To study following permanent slides:

i Root apex

ii Shoot apex

iii Parenchyma

iv Aerenchyma

v Chlorenchyma

vi Collenchyma

vii Sclerenchyma

viii Xylem- Spiral vessels, Pitted vessels

ix Phloem elements

Practical :4 **Stele**: Study of stele from permanent slides:

- Actinostele
- Plectostele
- Amphiphloic siphonostele
- Eustele
- Atactostele

Practical :5 **Vascular Bundles**:Study of various types of Vascular bundles from Permanent slides.

- Radial
- Amphicribral (Hadrocentric)
- Collateral and open
- Collateral and closed
- Bicollateral

Practical :6 **Non living cell contents:** Slides are to be prepared by the students from given materials.

- Starch grains: Potato tuber, Wheat or Rice, Euphorbia tiruculli.
- Mineral Crystals:

(a) Raphides: Pothos, Colocasia petiole

(b) Sphaeraphides: Opuntia, Nerium leaf

Practical :7 **Medicinal plants**: Scientific name, family, part use and medicinal uses of following:

- Ocimum sanctum
- Adhatodavasica
- Aloe barbedense
- Azadirachtaindica
- Abrusprecatorius
- Zingiberofficinale

Practical :8 **Plant pathology**: Causal organisms, symptoms and control measures of the following plant diseases

- Leaf spot of Mango
- Red rot of Sugarcane
- Bacterial blight of Paddy
- Little leaf of Brinjal
- Citrus Canker

Practical :9 **Weed Management:**Observation of weeds with reference to Botanical Name, Family, Morphologicalpeculiarities:

- Native – Cynadon , Cyprus, Amaranthus, Panicum
- Exotic/Invasive – Alternanthera, Desmostachya, Euphorbia, Malachara

Practical :10 Gymnosperms (Cycas)

- Preparation of slides from the fresh material by the students -:
  - T.S. of Rachis
  - T.S. of Leaflet
- Permanent Slides: T.S. of Leaflet, T.S. of Rachis, T.S. of Coralloid root, T.S. ofMicrosporophyll, T.S. of Megasporophull, L.S. of Ovule
- Preserve Specimen: Coralloid root, Microsporophyll and Megasporophyll

Practical :11 **Phyllotaxy:**

(i) Distichous phyllotaxy

(ii)Tristichous

(iii) Pentastichous

(iv) Opposite superpose

(v) Opposite decussate

(vi) Verticillate or Whorled

(vii) Leaf mosaic

(viii) Hetrophylly

Practical :12 **Aestivation**

- Valvate: Calyx of *Hibiscus rosasinensis*
- Twisted: Corolla of *Hibiscus rosasinensis*
- Imbricate: Corolla of *Caesalpiniapulcherrima*
- Quincuncial : Corolla of *Antigononleptopus*
- Vexillary : Corolla of *Clitoriaternatea*

Practical :13 **Inflorescence:**

- RACEMOSE

  (a) Raceme: Caesalpiniapulcherrima, Brassica juncea

  (b) Spike: Achyranthusaspera, Polianthestuberosa

  (c) Spadix: Colocasia

(d) Catkin: Acalyphahispida

(e) Spikelets: Poaceae (any plant)

(f) Corymb: Cassia, Ixora

(g) Umbel: Coriandrum

(h) Capitate: Acacia, Albizzia

(i) Capitulum: Helianthus, Tridax

- CYMOSE

Unbranched:

(a) Solitary Terminal: Datura

(b) Solitary Axillary: Hibiscus

Branched:

(c) Helicoid: Hamelia

(d) Scorpioid: Heliotropium

(e) Dichasial or Biparous: Clerodendrum, Nyctanthus, Jasminum

(f) Polychasial or Multiparous: Nerium, Calotropis

Practical :14 **Placentation**: Study of Placentation to be demonstrated by permanent slides.

(i) Marginal

(ii) Axile

(iii) Free central

(iv) Parietal

(v) Superficial

(vi) Basal

Practical :15 **Angiosperm: (Families)**

- Study of Morphological characters, floral dissection, T.S. of Ovary and floral formulae of following families.

(i) Malvaceae : *Hibiscus rosasinensis, Thespesia, Gossypium*

(ii) Convolvulaceae: *Ipomeapalmeta*

(iii) Apocynaceae : *Nerium, Allamanda, Catharanthusroseus*

(iv) Nyctaginaceae : *Bougainvallia, Mirabilis*

(v) Amaryllidaceae : *Crinum, Polianthes*

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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.)	

B.Sc. SEMESTER - IIIBOTANY PAPER - 2

(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.

B.Sc. SEMESTER - IIIBOTANY PAPER - 3

(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

B.Sc. SEMESTER - III

BOTANY PAPER - 4

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

B.Sc. SEMESTER – III

BOTANY PRACTICAL - 304

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. Rainguage
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., Clemitis, 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- Bougainvallia
3. Spathy- Colocasia
4. Involucaral -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

B.Sc. SEMESTER - IVBOTANY PAPER - 401

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

B.Sc. SEMESTER - IVBOTANY PAPER - 402

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

B.Sc. SEMESTER - IVBOTANY PAPER - 403

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)

B.Sc. SEMESTER - IVBOTANY
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.
- 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 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.; Connidia)
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)
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)

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 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 Arecaceae

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:

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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

29. Economic Botany Albert F. Hill 2nd Edi. 1976 Tata McGRAW Hill, New Delhi

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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B.Sc. SEMESTER - III

NUTRITION AND DIETETICS **(I.D.)**

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,

B.Sc. SEMESTER - IV

BIODIVERSITY (I.D.)

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.

T.Y. B. Sc. Botany Syllabus (As per CBCS System)

Subject wise credit

SEM	Course	Paper No.	Hours/Week	Credit		Practical No.	Hours/Week	Credit
V	Core I	BOT 501	2	2		XI	2	2
		BOT 502	2	2			2	
		BOT 503	2	2		XII	2	2
		BOT 504	2	2			2	
		BOT 505	2	2		XIII	2	2
		BOT 506	2	2			2	
	F.C. (English)		3	2		-	-	-
	E.C. CAN	Horticulture	3	2		-	-	-
	NSS/NCC/Saptadhara		3	2		-	-	-
VI	Core I	BOT 601	2	2		XIV	2	2
		BOT 602	2	2			2	
		BOT 603	2	2		XV	2	2
		BOT 604	2	2			2	
		BOT 605	2	2		XVI	2	2
		BOT 606	2	2			2	
	F.C. (English)		3	2		-	-	-
	E.C. CAN	Gardening	3	2		-	-	-
	NSS/NCC/Saptadhara		3	2		-	-	-

T.Y. B. Sc. Botany Syllabus (As per CBCS System)

T.Y.B.Sc. (To be implemented from June-2013) Theory Courses			
Paper	**Semester –V**	**Paper**	**Semester-VI**
BOT-501	Algae and Fungi	**BOT-601**	Pteridophytes and Paleobotany
BOT-502	Plant Pathology and Bryophyte	**BOT-602**	Gymnosperms, Fossil Gymnosperms And Botanical Techniques
BOT-503	Plant Biotechnology, Biostatistics And Molecular Biology	**BOT-603**	Cell Biology And Genetics
BOT-504	Plant Physiology And Biochemistry	**BOT-604**	Plant Ecology And Phyto-Geography
BOT-505	Anatomy and Embryology	**BOT-605**	Economic Botany And Pharmacognosy
BOT-506	Elective Paper: Angiosperm Morphology Systematic Botany & Environmental Issue	**BOT-606**	Elective Paper: Angiosperm Taxonomy & Palynology
CAN	Horticulture	**CAN**	Gardening

Practicals based on theory papers-

Pra. XI	Algae, Fungi, Bryophyte & Plant Pathology	**Pra. XIV**	Pteridophytes, Gymnosperms, Paleobotany & Botanical Techniques
Pra. XII	Plant Physiology, Biochemistry & Embryology	**Pra. XV**	Plant Ecology, Phyto-Geography, Cell Biology And Genetics
Pra. XIII	Angiosperm & Anatomy	**Pra. XVI**	Economic Botany, Pharmacognosy, Palynology & Angiosperm Taxonomy

T.Y.B.Sc.

SEMESTER V

BOTANY

T.Y. B. SC. BOTANY SYLLABUS (AS PER CBCS)

SEMESTER-V
BOTANY PAPER-501
BOT-501: ALGAE AND FUNGI

UNIT-1

General introduction of Algae

- Habit and habitat
- Thallus organization
- Classification according to Smith, General characters, structure and reproduction of the following classes:

I. **Cyanophyta**
II. **Chlorophyta**
III. **Phaeophyta**
IV. **Rhodophyta**

UNIT-2

Life History of Algae

- Life history of the following types on the basis of their classification with reasons, occurrence, thallus structure, cell structure and reproduction (Excluding development)

I. **Cyanophyceae** - ***Rivularia & Tolypothrix***
II. **Chlorophyceae**- ***Volvox & Chara***
III. **Phaeophyceae** - ***Sargassum***
IV. **Phodophyceae**- ***Polysiphonia***
V. **Bacillariophyceae**- ***Navicula***

UNIT-3

General introduction of Fungi

- Classification (Aim worth), and general characters of fungi
- Habitat, thallus, cell-structure, Nutrition, growth and reproduction in division Eumycota

UNIT-4

Life history of Fungi

- Life history of the following types on the basis of their classification with reasons, occurrence, vegetative structure and reproduction (Excluding development).

I. Mastigomycotina- Albugo

II. **Zygomycotina-** ***Pilobolus***

III. **Ascomycotina-** ***Penicillium***

IV. **Basidiomycotina-** ***Agaricus***

T.Y. B. Sc. BOTANY SYLLABUS (AS PER CBCS)

SEMESTER-V
BOTANY PAPER-502
BOT-502 PLANT PATHOLOGY AND BRYOPHYTE

UNIT-1

Plant Pathology

- Introduction & History of Plant Pathology
- Indian Plant Pathologist
- Reasons for plant diseases
- Origin of plant diseases
- Identification and characters of plant diseases
- Principles of control of plant diseases
- Fungicides
- Biopestisides

UNIT-2

Plant diseases according to plant pathogen

- **Bacterial diseases**
    - Wilt disease of potato
    - Leaf spot of mango
- **Fungal diseases**
    - Tikka disease of groundnut
    - Wilt of cotton
    - Powdery mildew of barley
    - Blast disease of Rice

- **Viral diseases**
    - Leaf curl of papaya
    - Yellow vain disease of Bhindi
    - Bunchy top banana

UNIT-3

General accounts of Bryophytes

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

UNIT-4

Life History of Bryophytes

- Classification, life history of the following types (Excluding development)

I. **Hepaticopsida :** ***Marchentia and Porella***

II. **Anthocerotopsida:** ***Notothylus***

III. **Bryopsida:** ***Sphagnum***

T.Y. B. Sc. BOTANY SYLLABUS (AS PER CBCS)

SEMESTER-V
BOTANY PAPER-503
BOT: 503- PLANT BIOTECHNOLOGY, BIOSTATISTICS AND MOLECULAR BIOLOGY

UNIT-1

Molecular Biology

- r-DNA methods- Merits, Demerits and Application
- Restriction endonuclease and Ligase
- Cloning vectors
- DNA- Finger printing
- PCR (Polymerize Chain Reaction)

UNIT-2

Plant Biotechnology-I

- Definition, History and Importance of Biotechnology
- Somatic Hybridization
- Artificial seed
- Anther culture
- Embryo culture

UNIT-3

Plant Biotechnology-II

- Clonal Propagation
- Genetic engineering of plant

- Genetic manipulation in plant cell
- Uses of biotechnology

UNIT-4

Biostatistics

- History of Biostatistics
- Definition, function and limitation of Biostatistics
- Importance of statistical methods in Biology
- Classification: Meaning, Important characters and types
- Measure of Central Tendency
    - Meaning
    - Characters
    - Mean, Mode and Median
- Standard deviation

T.Y. B. Sc. BOTANY SYLLABUS (AS PER CBCS)

SEMESTER-V
BOTANY PAPER-504
BOT: 504- PLANT PHYSIOLOGY AND BIOCHEMISTRY

UNIT-1

Plant Physiology-I

- Diffusion, Osmosis, Plasmolysis
- Absorption- Active and Passive
- Ascent of sap- Including theories
- Translocation- Upward, downward and lateral
- Photosynthesis
- Respiration

UNIT-2

Plant Physiology-II

- Growth
- Mineral nutrition
- Plant growth substance
    - **Growth promoter- Auxin, Gibberellins and Cytokinin**
    - **Growth retardant- ABA and Ethylene**

UNIT-3

Physiological instrument

I. Isotop
II. Colorimeter
III. Spectrophotometer

IV. Ultracentrifuge

V. pH Meter

- Chromatography

UNIT-4

<u>Biochemistry</u>

- pH and Buffer
- Solution and colloidal system
- Protoplasm as a colloidal system
- **Enzymes**
    - Definition, Classification, properties
    - Factor affecting rate of enzymatic activities and mechanism of enzyme action.
- **Amino acids**
- **Carbohydrate**

T.Y. B. Sc. BOTANY SYLLABUS (AS PER CBCS)

SEMESTER-V
BOTANY PAPER-505
BOT: 505- ANATOMY AND EMBRYOLOGY

UNIT-1

Plant Anatomy-I

- Laticiferous tissues
    - Introduction, Latex cells- Structure and function
    - Articulated laticifers
- Root- stem transition
- Vascular cambium
    - General development and Structure of the vascular cambium
    - Types of cambium
    - Seasonal activity of cambium
- Nodal anatomy

UNIT-2

Plant Anatomy-II

- Periderm- Origin, Structure and Function
- Lenticell
- Leaf abscission
- Anomalous Secondary Growth
- **Stem:-** Bouganvilliea, Mirabilis, Tinospora
- **Root:-** Radish, Beet

UNIT-3

Embryology-I

- Megasporogenesis
- Types of embryosasc
- **Monosporic (Polygonum- eight nucleated types)**
- **Bisporic (Allium-Eight nucleated types)**
- **Tetrasporic (Fritillaria- Eight nucleated types)**
- Fertilization (Double fertilization) and Significance of double fertilization
- Endosperm

UNIT-4

Embryology-I

- Embryo
- Embryogenesis in Dicot (Nicotiana)
- Embryogenesis in Monocot (Poa)
- Nutrition of embryo
- Poly embryony
    - Types (Factor for poly embryony),
    - Causes of poly embryony,
    - Experimental induction of poly embryony,
    - Classification of poly embryony
    - Practical value of poly embryony

T.Y. B. Sc. BOTANY SYLLABUS (AS PER CBCS)

SEMESTER-V
BOTANY PAPER-506
BOT: 506- ELECTIVE PAPER
ANGIOSPERM MORPHOLOGY, SYSTEMIC BOTANY AND ENVIRONMENTAL ISSUES

UNIT-1

Plant Morphology

- Leaf: Shape, margin, apex of lamina
- Calyx: Modification of Calyx
- Corolla: Form of corolla
- Seed
- Apiphyte, Parasite and Saprophyte

UNIT-2

Introduction of Plant Taxonomy

- History of Taxonomy
- Types of classification: Natural, Artificial and Phylogenetical
- Fundamentals of nomenclature
- Definition, need for nomenclature, common name and scientific name
- Binomial nomenclature and ICBN

UNIT-3

Angiosperm Families

- Taxonomical studies of the following families with references to their geographical distribution, systematic position, floral variations and economic importance.

I. Ranunculaceae
II. Annonaceae
III. Menispermaceae
IV. Tiliaceae
V. Vitaceae
VI. Apiaceae
VII. Sapotaceae
VIII. Acanthaceae
IX. Polygonaceae
X. Loranthaceae
XI. Musaceae
XII. Poaceae

UNIT-4

Environmental Issue

- Global warming
- Greenhouse effects
- Ozon depletion
- Acid rain
- Environmental act: Environmental protection act, The air act, The water act, Wildlife protection act, forest conservation act
- Plant and pollution control

T.Y. B. Sc. BOTANY SYLLABUS (AS PER CBCS)

SEMESTER-V
CAN SUBJECT : HORTICULTURE

Unit-1

Introduction of Horticulture

- Definition, Aims, Branches and importance of horticulture
- Propagation Methods
- Cutting
- Layering
- Through Specialized structures (Corm, Rhizome, bulb, tuber, runner, sucker)
- Budding,
- Grafting

Unit-2

Preservation

- Definition, principles, different methods of preservation and storage of fruits and vegetables.
- Preparation of Jam, Jelly and Sauce.
- Causes of spoilage of fruits
- Role of Hormones in Horticulture

Unit-3

Cultivation of Fruit plants

- Cultivation of following fruit crops with reference to their origin, distribution, climate, soil, propagation, method of cultivation, harvesting and at least three varieties of each crop

I. Mango
II. Banana
III. Sapota
IV. Papaya
V. Coconut
VI. Lemon
VII. Guava

Unit-4

Cultivation of Vegetable plants

- Cultivation of following vegetable crops with reference to their origin, distribution, climate, soil, propagation, method of cultivation, harvesting and at least three varieties of each crop

I. Carrot
II. Potato
III. Brinjal
IV. Lady's finger
V. Cucumber
VI. Cabbage
VII. Methi

T.Y. B. SC. BOTANY Practical SYLLABUS (AS PER CBCS)

SEMESTER-V

BOT PRA. XI : Algae, Fungi, Bryophyte & Plant Pathology

(A) ALGAE :

(1) *Rivularia* :
To study the thallus structure and heterocyst.
(2) Tolypothrix :
To study the thallus structure.
(3) *Volvox* :
To study the Volvox colony.
(4) *Chara* :
To study the specimen of Chara, T.S. of the main axis and Sex organs.
(5) *Sargassum* :
To study the plants of Sargassum, Anatomy of main axis, leaf and air bladder.
(6) *Polysiphonia* :
To study the thallus structure and cystocarp.
(To study the permanent slides of the above types.)

(B) FUNGI :

(1) *Albugo* :
To study vegetative structure.
(Permanent slide of Albugo conidia, Reproductive organs and Oospores.)
(2) Pilobolus:
To study vegetative structure.
(Permanent slide of *Pilobolus* WM, Reproductive organs)
(3) *Penicillium* :
To study the vegetative structure and Conidiophores.
(Permanent slide of *Penicillium* vegetative Conidiophores with conidia.)
(4) *Agaricus* :
To study the Basidiocarp.

(Permanent slide of T.S. of Stipe, T.S. of Pileus, Button stage v.s. of Agaricus.)

(C) BRYOPHYTA :

(1) Marchentia

To study the external morphology of *Marchentia* plant.

(Permanent slide of *Marchentia* veg., W.M. and L.S. of sporophyte.)

(2) *Porella* :

To study the external morphology of *Porella* plant.

(Permanent slide of *Porella* veg. W.M. and L.S. of sporophyte.)

(2) Nothothylus :

To study the external morphology of *Notothylus* plant.

(Permanent slide of *Notothylus* W.M. and L.S. of sporophyte.)

(3) Sphagnum :

To study the external morphology of *Sphagnum*.

(Permanent slide of *Sphagnum* W.M. and L.S. of sporophyte.)

(D) PLANT DISEASES :

Casual organism and Symptoms of following plant diseases.

- **Bacterial diseases**
  - Wilt disease of potato
  - Leaf spot of mango
- **Fungal diseases**
  - Tikka disease of groundnut
  - Wilt of cotton
  - Powdery mildew of barley
  - Blast disease of Rice
- **Viral diseases**
  - Leaf curl of papaya
  - Yellow vain disease of Bhindi
  - Bunchy top banana

T.Y. B. SC. BOTANY Practical SYLLABUS (AS PER CBCS)

SEMESTER-V

BOT PRA. XII : Plant Physiology, Biochemistry & Embryology

(A) PHYSIOLOGY :

Following physiological experiments are to be set up by the student. (Requirements to be submitted by the students.)

(1) To find out rate of photosynthesis by bubble counting method.
(2) To find out effect of co2 concentration on rate of Photosynthesis.
(3) To find out effect of light intensity on the rate of Photosynthesis.
(4) Experiments on enzyme action:
(i) Amylase (ii) Invertase.
(5) To study the activity of enzyme Urease and the factors effecting the activity. (Concentration and Time)
(6) Estimation of total sugar and reducible sugar.
(7) Separation of amino acids by paper chromatography.
(8) Uses of colorimeter and PH meter.
(9) Estimation of Amino acid by Colorimetric method.
(10) Estimation of Phosphorus by Colorimetric method.
(11) Estimation of Ethyl acetate.

(B) Following physiological experiments are for demonstration only.

(1) Experiment to demonstrate the process of transpiration.
(2) Demonstration of the stomatal transpiration by four leaves method.
(3) To demonstrate that oxygen is used during respiration.
(4) To measure the growth rate by lever auxanometer.
(5) To demonstrate that separation of chloroplast pigments by thin layer Chromatography.

(C) PHYSIOLOGICAL INSTRUMENTS:

Study of physiological instruments:
(i) Colorimeter (ii) Spectrometer
(iii) ultracentrifuge (iv) pH meter.

(D) BIOCHEMISTRY:

- **Test for reducing sugar**
  - Fehling's test
  - Benedict's test
  - Barfoed's test
  - Trommer's test
  - Moore's test
- **Test for non- reducing sugar**
  - Fehling's test
  - Benedict's test
- **Test for Amino acid**
  - Ninhydrin test
  - Test for Tyrosine
  - Test for tryptophan
  - Test for Cysteine

(E) EMBRYOLOGY:

(1) Embryo mounting in any available dicot plant.

(2) Permanent slide of the following:

(a) EMBRYOLOGICAL STAGES:

(i) T.S. of Anther Showing Four Mature Pollen Sacs

(ii) T.S. of Mature Anther Showing Dehiscence

(iii) Pollen Tetrads

(iv) Pollinia

(v) Germination of Pollengrain.

(b) Megasporangium:

(i) Two celled stage of Megaspore Mother Cell

(ii) Ovule with Binucleate Embryo-sac

(iii) Ovule with 4-nucleate Embryo-sac

(iv) Ovule with 8-nucleate Embryo-sac

(c) Embryo:

(i) Globular embryo

(ii) Heart-shaped embryo

(iii) Mature embryo

T.Y. B. SC. BOTANY Practical SYLLABUS (AS PER CBCS)

SEMESTER-V

BOT PRA. XIII : Angiosperm & Anatomy

(A) ANGIOSPERM:

(a) **Leaf Shape**:

- Linear : *Grasses*
- Lanceolate: *Nerium*
- Elliptical: *Guava*
- Ovate: *China rose*
- Obovate: leflet of *Cassia obtusifolia*
- Oblong: *Banana*
- Reniform: *Centilla asiatica*
- Cordate: *Betel*
- Sagittate: *Sagittaria sagittifolia*

(b) **Leaf margin**:

- Entire*: Mango*
- Sinuate: *Polyalthia*
- Serrate*: China rose*
- Dentate: *Melon*
- Denticulate: *Coccinia cordifolia*
- Lobed: *Ranunculus*

(c) In taxonomic studies of angiosperms, plants available in the local area shoud be given.

(i) Ranunculaceae
(ii) Annonaceae
(iii) Menispermaceae
(iv) Tiliaceae
(v) Vitaceae

(vi) Apiaceae
(vii) Sapotaceae
(viii) Acanthaceae
(ix) Polygonaceae
(x) Loranthaceae
Xi) Musaceae
(xii) Poaceae

(B) ANATOMY :

(1) T.S. of the following stem for anomalous secondary growth.
(i) *Bougainvillea*, (ii) *Mirabilis*, (iii) *Tinospora*.
Permanent slide: (i) *Bougainvillea* stem T.S. (ii) *Mirabilis* stem T.S.
(iii) *Tinospora* stem T.S.
(2) T.S. of the following root for anomalous secondary growth.
(i) Beet (ii) Radish (iii) Carrot
Permanent slide: (i) Beet root T.S. (ii) Radish root T.S.
(iii) Carrot root T.S.
(3) Preparation of permanent slide. (Safranin - Fast Green Combination)
(4) To measure the dimensions of common microorganisms by calibration and standardization of microscope using stage micrometer and ocular micrometer.
(5) Measurement of microscopic structure and sketching with camera lucida.
(6) Permanent slide of the following :
(i) Laticiferous tissue
(ii) Periderm
(iii) Lenticell
(iv) Leaf fall
(v) Latex cell.
(7) Preparation of slides for nodal anatomy.
(i) Unilacular
(ii) Trilocular.

X_____X_____X_____X_____X_____X_____X_____X_____X

T.Y.B.Sc.

SEMESTER VI

BOTANY

VEER NARMAD SOUTH GUJARAT, UNIVERSITY, SURAT

T.Y. B. Sc. BOTANY SYLLABUS (AS PER CBCS)

EFFECTIVE FROM JUNE-2013

SEMESTER-VI
BOTANY PAPER-601
BOT: 601- PTERIDOPHYTES AND PALEOBOTANY

UNIT-1

General introduction of Pteridophyte

- General character of pteridophytes
- Classification of pteridophytes according to G.M. Smith and Riemers
- General character of following classes
  - **I. Psilophytopsida**
  - **II. Psilotopsida**
  - **III. Lycopsida**
  - **IV. Sphenopsida**
  - **V. Pteropsida**
- Habit and Habitat, body structure, internal characters, Reproduction, Gamatophytic phase and Alternation of generation in pteridophytes

UNIT-2

Life History of Pteridophyte

Classification and life history of following types

I. **Lycopsida-** ***Selagenella***

II. **Pteropsida-** ***Ophioglosum and Azolla***

UNIT-3

Paleobotany

- Introduction
- Fossilllization and types of fossile
- Nomenclature of fossils
- Geological time table

UNIT-4

Life History of Pteridophyte

Classification and life history of the following types (Excluding development)

I. **Psilophytopsida- *Rhynia***
II. **Psilotopsida- *Psilotum***
III. **Lycopsida- *Lepidodendron***
IV. **Sphenopsida- *Sphenophyllum***

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SEMESTER-VI
BOTANY PAPER-602
BOT: 602- GYMNOSPERM, FOSSIL GYMNOSPERM AND BOTANICAL TECHNIQUES

UNIT-1

Gymnosperm-I

- Introduction and General characters of
- Affinities of gymnosperm with pteridophytes and angiosperm
- Classification and importance characters of following orders

I. Cycadofilicales
II. Bennettitales
III. Cycadales
IV. Corditales
V. Coniferales
VI. Ginkgoales
VII. Gnetales

UNIT-2

Gymnosperm-II

- Classification and life histories of following types (Excluding development)

I. Taxus
II. Ginkgo
III. Ephedra

UNIT-3

Fossil Botany

General accounts of following types

I. **Cycadofilicales-** ***Lyginopteris***

II. **Cycadeoidales-** ***Cycadeoidea***

III. **Corditales-** ***Cordaites***

UNIT-4

Botanical techniques

- **Herbarium techniques**
  - Introduction
  - Field and collection techniques
  - Function of herbaria
- **Micro techniques**
  - Fixative and fixation
  - Dehydration
  - Infiltration
  - Microtomy
  - Stains
- **Whole mount of minute object**
- **Camera lucida**

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SEMESTER-VI
BOTANY PAPER-603
BOT: 603- CELL BIOLOGY AND GENETICS

UNIT-1

Cell Biology-I

- Ultra structure and function of following organelles

I. **Cell-wall**
II. **Chromosomes**
III. **Ribosome**
IV. **Golgi complex**
V. **Lysosomes**
VI. **ER (Endoplasmic reticulum)**
VII. **Nucleus**

UNIT-2

Cell Biology-II

- Cell-cycle
- Mitosis
- Mieosis

UNIT-3

Genetics- I

- Nucleic acids
- Introduction
- Structure and types of DNA and RNA
- DNA- Replication
- Transformation and transduction

UNIT-4

Genetics-II

- Genetic code
- Mutation
- Lac-operan
- Chromosomal aberrations
- Protein synthesis (Transcription and translation)

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SEMESTER-VI
BOTANY PAPER-604
BOT: 604- PLANT ECOLOGY AND PHYTO-GEOGRAPHY

UNIT-1

Ecology

- Introduction, Definition and Brief account of ecological factor.
- Soil as an Edaphic factor
    - Composition of soil
    - Origin and development of soil
    - Soil moisture
    - Soil profile
- Biotic factor- Relationship among the organisms

UNIT-2

Plant community

- Definition, Characteristics and classification of plant community
- Characters of plant community (Analytical and Synthetical)
- Ecological niche
- Methods of studying vegetation
    - Quadrate
    - Transect

UNIT-3

Plant succession

- Definition and Causes of succession
- Process in succession
- Kinds of succession
- Rate of succession
- Limiting factors and trend in succession
- Hydrosere and xerosere

UNIT-4

Phyto-geography

- Forest vegetation of Gujarat
- Mangrove vegetation
- Desert of Gujarat
- Vegetation types of Himalaya
- Remote sensing
- Biological clock or Ecological clock

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SEMESTER-VI
BOTANY PAPER-605
BOT: 605- ECONOMIC BOTANY AND PHARMACOGNOSY

UNIT-1

Plants and their utilization

- Fibers
  - Introduction and classification of fibers
  - Plant fibers: Cotton, Jute and Coir
- Timber and firewood species
  - Definition and properties of wood
  - Types of wood
  - Uses of wood
- Distribution, botanical name, family and uses of following timber and firewood plants

I.	***Accacia nilotica***	***V.***	***Anogeissus letifolia***
II.	***Azadirachta indica***	***VI.***	***Dalbergia latifolia***
III.	***Gemelina arborea***	***VII.***	***Mitragyna pervifolia***
IV.	***Tectona grandis***	***VIII.***	***Terminalia chrnulata***

UNIT-2

Beverages and Beverage plants

- Classification of Beverage plants
- Origin, Botanical description, cultivation, preparation and uses of following beverage plants

- **Non Alcoholic Beverages:- Tea, Coffee and Cocoa & Chocalate**
- **Alcoholic Beverages:- Wine, Beer and Tadi**

UNIT-3

Introduction of Pharmacognocy

- Evaluation of drugs by following methods
  - Organoleptic evaluation

- Microscopic evaluation
- Biological evaluation
- Chemical evaluation
- Physical evaluation

- Classification of drugs
  - Classification of drug on the basis of Taxonomy
  - Classification of drug on the basis of Chemical present
  - Classification of drug on the basis of mode of action

UNIT-4

Plant drugs

- Drugs obtained from root: Cochicum
- Drugs obtained from bark: Holarrhena
- Drugs obtained from leaves: Adhatoda
- Drugs obtained from fruits: Dill (Sowa) and Poppy
- Drugs obtained from seeds: Nux vomica
- Underground drugs: Gum and Aloes

Medicinal Plants

- Scientific name, family, distribution, parts used and uses of following medicinal plants
  - ***I. Agele marmelos***
  - ***II. Cassia tora***
  - ***III. Trigonella foenum-graecum***
  - ***IV. Andrographis peniculata***
  - ***V. Aristolochia bracteolate***
  - ***VI. Enicostema axillare***
  - ***VII. Rauwolfia serpentine***
  - ***VIII. Withania somnifera***

T.Y. B. Sc. BOTANY SYLLABUS (AS PER CBCS)

SEMESTER-VI
BOTANY PAPER-606
BOT: 606- ELECTIVE PAPER- TAXONOMY AND PALYNOLOGY

UNIT-1

Botanical garden

- Aims of Botanical garden
- Prerequisite of Botanical garden
- Various Botanical gardens of World and India
    - Royal Botanical Garden - Kew
    - New York Botanical Garden- New York
    - Indian Botanical Garden-Calcutta
    - Loyd Botanical Garden- Darjeeling

BSI (Botanical Survey of India)

- Introduction and main objectives of BSI

UNIT-2

Major system of classification of following Botanist and its merits and demerits

► Angler and Prantl

► John Hutchinson

► Bessey

UNIT-3

Angiosperm Families

- Taxonomical studies of the following families with references to their geographical distribution, systematic position, floral variations and economic importance.

I. Papavaraceae
II. Portulacaceae
III. Rutaceae
IV. Rhamnaceae
V. Sepindaceae
VI. Anacardiaceae
VII. Lythraceae
VIII. Oliaceae
IX. Boraginaceae
X. Basalaceae
XI. (11)Casuranaceae
XII. (12) Hydrocheritaceae
XIII. (13)Orchidaceae

UNIT-4

Palynology

- Introduction
- Pollen morphology
- Ancient applied aspects of palynology
- Importance of pollen: In food, In medicine, In agriculture and In breeding
- Pollen allergy: Diseases, allergens and control

T.Y. B. Sc. BOTANY SYLLABUS (AS PER CBCS)

SEMESTER-VI
CAN SUBJECT : GARDENING

Unit-1

- **Soil :-** Definition, types, components and merits of soil analysis
- **Land scaping**
- **Garden:-** Definition and types of garden, Lawn, Kitchen garden

Unit-2

- **Plough:-** Definition, care taken during plough and merits
- **Manure:-** Organic manure, fertilizer, vermicompost
- **Irrigation:-** Definition, types and importance

Unit-3

- **Pruning:-** Definition, principles, aims, effect on growth and care taken during pruning
- **Framing:-** Definition, types and importance of framing
- **Fencing:-** Definition, types of fencing i.e thorny, wall, wire, wind breaker and importance of fencing

Unit-4

- **Flower arrangement:** Flower and flower arrangement, Importance of flower in home decoration, Types and principles of flower arrangement, Law of flower arrangement, Selection of flower vase, flower and place of arrangement
- **Cultivation of following flowering plants**
    - **I. Rose**
    - **II. Marigold**
    - **III. Gerbera**
    - **IV. Crinum**
    - **V. Chrysanthemum**

T.Y. B. Sc. BOTANY PRACTICAL SYLLABUS (AS PER CBCS)

SEMESTER-VI

BOTANY PRACTICAL –XIV

Pteridophytes, Gymnosperms, Paleobotany and Botanical Techniques

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(A) Pteridophytes

(1) Selaginella

To study the 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.)

(2) Ophioglossum

To study the external morphology of *Ophioglossum* anatomical characters of stem, leaf and Fertile Spike of *Ophioglossum*

(Permanent slide of *Ophioglossum* stem T. S. and *Ophioglossum* Spike L.S.)

(3) Azolla

To study the external morphology of *Azolla* plant with spore producing organs, anatomy of stem and sporocarp (Permanent slide of *Azolla* stem T.S., Sporocarp T.S. and L.S.)

(B) Fossil Pteridophytes

To study following Fossil Slides

(1) Rhynia: (I) T.S. of stem

(2) Lepidodendron

(I) T.S. of *Lepidodendron* Stem (II) T.S. of Lepidophyllum (III) L.S. of Lepidostrobus (IV) T.S. of Stigmaria rootlet (V) T.S. of Stigmaria rootlet with secondary xylem.

(3) Sphenophyllum: (I) T.S. of *Sphenophyllum* Stem (II) T.S. of *Bowmanltes*

(4) Calamites : (I) T.S of *Calamites* stem

To study following Fossil Stone

(I) *Calamites* stem and *Annularia*

(C) Gymnosperms

(1) Taxus

To study the external morphology of *Taxus* stem, leaf and cone (Permanent slide of *Taxus* Stem T.S., Wood T.S., Leaf T.S., Female cone T.S. and Male cone T.S.)

(2) Ginkgo

To study the external morphology of *Ginkgo* Stem, Leaf and Cone

(3) Ephedra:

To study the external morphology of *Ephedra* Stem and male and female cone (Permanent slide of *Ephedra* stem and root T.S., male and female cone L.S.)

(D) Fossil Gymnosperms

To study following Fossil Slides

(I) *Lyginopteris* Stem T.S.

(II) *Laglnostoma* L.S.

(III) *Cordaites* root T.S.

(IV) *Cordaites* leaf T.S.

To study following Fossil Stone

(I) *Cordaites* leaf

(II) Pterophyllum

T.Y. B. Sc. BOTANY PRACTICAL SYLLABUS (AS PER CBCS)

SEMESTER-VI

BOTANY PRACTICAL –XV

Plant Ecology, Phyto-Geography, Cell Biology

Plant Ecology

(A) To study communities by quadrate method and to determine % Frequency, Density and Abundance.

(B) To study the biotic components of a pond ecosystem.

(C) Following ecological experiments are to be set up by the student.
(Requirements to be submitted by the students.)

(1) To determine the amount of dissolved oxygen in the pond water.

(2) To determine the total dissolved solids (TDS) in water.

(3) To determine the amount of chlorides in the water.

(4) To find out the moisture percentage of the soil.

(5) To find out the total hardness of the water.

(6) To determine the amount of calcium in the water.

(7) To determine the amount of magnesium in the water.

(8) To determine the amount of total alkalinity in the water.

(A) Study of ecological Instruments

(1) Psychrometer

(2) Prismatic compass

(3) Rainguage

(4) Soil thermometer

(C) Cytology

(1) To study the mitosis by preparing squash of onion root tip.

(2) To study the meiosis by preparing slide of *Aloe vera* Anther

To study different stages of Mitosis and Meiosis by Chart/ Permanent Slides/ Model.

T.Y. B. Sc. BOTANY PRACTICAL SYLLABUS (AS PER CBCS)

SEMESTER-VI

BOTANY PRACTICAL –XVI

Economic Botany, Pharmacognosy and Angiosperm Taxonomy

(A) Economic Botany

(1) Fibers :

Distribution, Botanical name, Family and uses of following.

(I) Cotton (II) Jute (III) Coir

(2) Timber:

Botanical name, family and uses of following :

(I) *Accacia nilotica* (II) *Anogessus latifolia*

(III) *Azadirechta indica* (IV) *Dalbergia latifolia*

(V) *Gmelina arborea* (VI) *Mitragyna parvifolia*

(VII) *Tectona grandis* (VIII) *Terminalia chrunulata*

(3)Beverages:

Distribution, Botanical name, Family and uses of following beverages

(I)Tea (II) Coffee (III) Cocoa

(B) Pharmacognosy:

Botanical name, Family, plant part used and uses of following plant drugs

(I) Colchicum (II) Holarrhena (III) Adhatoda

(IV) Dill (V) Poppy (VI) Nux vomica

(C) Medicinal Plant:

Scientific name, family and uses of following medicinal plants

(I)	*Agele marmelos*	(II)	*Cassia tora*
(III)	*Trigonella foenum-graecum*	(IV)	*Andrographis peniculata*
(VI)	*Aristolochia bracteolate*	(VI)	*Enicostema axillare*
(VII)	*Raulfia serpentina*	(VII)	*Withania somnifera*

(E) Angiosperm Taxonomy:

In taxonomic studies of angiosperms, plants available in the local area should be given

(I)	**Papavaraceae**	**(VII)**	**Lythraceae**	**(XIII)**	**Orchidaceae**
(II)	**Portulacaceae**	**(VIII)**	**Oliaceae**		
(III)	**Rutaceae**	**(IX)**	**Boraginaceae**		
(IV)	**Rhamnaceae**	**(X)**	**Basalaceae**		
(V)	**Sepindaceae**	**(XI)**	**Casuranaceae**		
(VI)	**Anacardiaceae**	**(XII)**	**Hydrocheritaceae**		

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