T.Y.B.Sc.

SEMESTER V

BOTANY

Veer Narmad South Gujarat, University, Surat
T.Y. B. Sc. Botany Syllabus (As per CBCS System)
Effective from June-2013
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	-	-	-

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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

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EFFECTIVE FROM JUNE-2013

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***

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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***

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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

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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

Biochemistry

- 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**

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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

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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

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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

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

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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

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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

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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.

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