

**Gujarat University
Ahmedabad**

**Semester - V and VI
Syllabi for Botany, Theory and Practical
Academic Year 2013-2014**

**Gujarat University
Ahmedabad
B. Sc. Botany Semester - V
Syllabi for Botany Theory and Practical
Academic Year 2013-2014**

| Unit | Botany Theory Bot-301 4 credits Total 100 marks Internal 30 Marks External 70 marks 4 hrs/week | Botany Theory Bot-302 4 credits Total 100 marks Internal 30 Marks External 70 marks 4 hrs/week | Botany Theory Bot-303 4 credits Total 100 marks Internal 30 Marks External 70 marks 4 hrs/week | Botany Theory Bot-304 4 credits Total 100 marks Internal 30 Marks External 70 marks 4 hrs/week | Botany subject elective Bot-305 2 credits Total 100 marks Internal 30 Marks External 70 marks 3 hrs/week | Botany Practical Bot-306 5 credits Total 200 marks Internal 60 Marks External 140 marks 12hrs/week |
|------|--|--|--|--|--|--|
| I | Algae | Systematic Botany | Plant Physiology | Ecology | Student has to select one subject elective course from the University approved Subjects of elective courses. Production Horticulture | There are two Practicals: i.e. Practical I and II. Each practical has 2 sessions (I & II), each of 3 hours |
| II | Fungi | Angiosperms | Biochemistry | Plant Geography | | |
| III | Bryophytes | Embryology | Cell Biology | Economic Botany | | |
| IV | Pteridophytes | Anatomy | Genetics | Biostatistics | | |

Instructions :

- Students **must be taken on a Botanical excursion for studying vegetation in natural state.**
- **Project report, Excursion report, garden visit report and submission of specimens during the practical examination will be given due weightage.**
- Students **are expected to submit the following at the various respective examinations :**
- Students **are expected to submit Cryptogamic specimens, Gymnospermic specimens, Angiospermic specimens, Herbarium sheets of angiospermic plants (Minimum 10), Specimens, wood Products and herbarium sheets of Economic botany and Ethnobotany, Permanent slides of anatomy**
- **Students must record the work done in the laboratory in the journal.**
- **The journal is to be certified by the in charge teacher and Head of the department.**
- **Certified journals have to be produced while appearing at the time of examination**

GUJARAT UNIVERSITY
BOTANY
Choice Based Credit System (CBCS) Theory syllabus
Effective from June-2013
SEMESTER V
BOTANY
BOT 301
(Algae, Fungi, Bryophytes, Pteridophytes)

301/1

UNIT: I

ALGAE:

[10 Lect.]

Structure, Reproduction (excluding development) and life history:

CYANOPHYTA: Rivularia, Scytonema

CHLOROPHYTA: Coleochaete, Chara

PHAEOPHYTA: Sargassum,

RHODOPHYTA: Polysiphonia

Role of Algae in human welfare (Industrial utilization, Pollution indicators)

301/2

UNIT: II

FUNGI:

[10 Lect.]

Occurrence, Distribution, Structure, Reproduction, utilization and life history (excluding development): MASTIGOMYCOTINA: Phytophthora

ASCOMYCOTINA: Peziza and Aspergillus

(Eurotium) BASIDIOMYCOTINA: Ustilago

General account of Mycoplasma and Actinomycetes

General Account of Mushroom cultivation

301/3

UNIT: III

BRYOPHYTES:

[10 Lect.]

Adaptation in Bryophytes and land plants

Comparative account of morphology, anatomy, reproduction and adaptation in Riccia, Marchantia, Pellia, Notothylas, Polytricum and Funaria.

Evolution of Sporophyte

Structure, Reproduction and life history (excluding development): HEPATICOSPODIA: Pellia

ANTHOCEROTOPSIDA: Notothylas

BRYOPSISIDA: Polytrichum, Sphagnum

301/4 UNIT: IV

PTERIDOPHYTES: (including Fossils)

[10 Lect.]

Classification of Pteridophytes by Reimer (1954)

Structure, Reproduction and life history (excluding development):

PSILOTOPSIDA: Psilotum

SPHENOPSISIDA: Equisetum

Stelar evolution in Pteridophytes

GUJARAT UNIVERSITY
BOTANY
Choice Based Credit System (CBCS) Theory
syllabus Effective from June-2013
SEMESTER V
BOTANY
BOT 302
(Systematic Botany, Angiosperms, Embryology and Anatomy)

302/1 **UNIT: I**

SYSTEMATIC BOTANY: [10 Lect.]
Principles of taxonomy, merits and demerits of systems of classification of Bentham and Hooker,
Engler and Prantle
ICBN: Principles and rules
Typification
Priority
Effective and valid publications
Herbarium techniques: Plant collection and preparation of Herbarium
Some important Herbaria of India
Role of Herbaria and Botanical Gardens

302/2 **UNIT: 2**

ANGIOSPERMS: [10 Lect.]
Classification as per Bentham and Hooker with economic importance
DICOTYLEDONS:
Polypetalae: Menispermaceae, Capparidaceae, Sterculiaceae, Rhamnaceae
Gamopetalae: Asclepiadaceae, Boraginaceae, Bignoniaceae
Apetalae: Chenopodiaceae
MONOCOTYLEDONS: Commelinaceae, Cyperaceae

302/3 **UNIT: 3**

EMBRYOLOGY: [10 Lect.]
Palynology
Exine ornamentation, concept of palynogram
Application of Palynology in Taxonomy, coal, oil exploration and forensic science
Germination of pollen tube and factors affecting pollen germination
Endosperms: Types and functions of Endosperms
Embryo development in Dicotyledons
Crucifer type of embryo development
Embryo development in Monocotyledons
Sagittaria, Sagittifolia type of embryo development
Apomixis

302/4 **UNIT: 4**

ANATOMY [10 Lect.]
Mechanical tissue system
Secretory tissue system (excluding Laticiferous)
Absorbing tissue system
Root development: lateral roots; root hairs; root-microbe interaction.
Leaf – fall
Root – stem transition

GUJARAT UNIVERSITY
BOTANY
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Effective from June-2013
SEMESTER V
BOTANY
BOT 303
(Plant Physiology, Biochemistry, Cell Biology, Genetics)

303/1 **UNIT: 1**
PLANT PHYSIOLOGY: [10 Lect.]

Dormancy: Causes of dormancy
Methods of breaking dormancy
Germination : Different phases of germination
Factors affecting germination
Growth : Some aspects of overall growth and its modifications
Growth correlations
Respiration: Pentose phosphate pathway (PPP)
R.Q. and Factors affecting respiration

303/2 **UNIT: 2**
BIOCHEMISTRY: [10 Lect.]

Amino acids: Classification, structure, protein and non-protein amino acids
Protein: Classification of protein on the basis of structure
Lipids: Synthesis, alpha & Beta -oxidation
Nitrogen metabolism and Nitrogen fixation
General account of structure and functions of vitamins

303/3 **UNIT: 3**
CELL BIOLOGY: [10 Lect.]

[10 Lect.]
Ultra structures and functions:
Plasma membrane: Structure, Unit membrane concept, Sandwich model, Greater membrane concept, Fluid-mosaic model
Chromosomes: Morphology and structure of Polytene chromosome, Lamp brush chromosome
Cell differentiation
Cell-cell interaction
Cell Cycle:
Interphase
Mitosis
Meiosis
Programmed Cell Death (PCD) in plants

303/4

UNIT: 4

GENETICS:

[10 Lect.]

DNA finger printing and its importance
DNA damage and repair

Linkage: Coupling & Repulsion hypothesis; Linkage groups

Crossing over: Chromosome mapping. Three point test cross; interference and coincidence
Introns and their significance

Gene mutations- Types- somatic/germ line, spontaneous/induced, gross/point- base pair substitutions-transversion, transition; effect of substitution mutation on phenotype- Missense, Nonsense, Neutral, Silent mutations

Eukaryotic genome organization: structure of chromatin, coding and noncoding sequences, satellite DNA

GUJARAT UNIVERSITY
BOTANY
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Effective from June-2013
SEMESTER V
BOTANY
BOT 304
(Ecology, Plant Geography, Economic Botany, Biostatistics)

304/1

UNIT: 1

ECOLOGY:

[10 Lect.]

Vegetation development: Causes and types of succession: Mechanism of ecological succession;
Changes in ecosystem properties during succession; Hydrosere, Xerosere.
Structure of Plant Communities; Methods of studying plant communities: Analytical and Synthetic
characters of plant community; Raunkiaer's life forms, Biological Spectrum.
Plant community as Plant indicators
Principles of limiting factors

304/2

UNIT: 2

PLANT GEOGRAPHY:

[10 Lect.]

Phytogeography: definition, aims, objectives, scope and relation with other disciplines
Major and minor biomes of the world
Soil and climate of India
Botanical regions of India
Vegetation of Gujarat
Endemism
Continuous and discontinuous distribution; continental drift theory; centres of origin.

304/3

UNIT: 3

ECONOMIC BOTANY:

[10 Lect.]

General account, Methods of cultivation, climate and uses:
CEREALS: Maize, Bajra
PULSES: Tuber
PLANTATION CROPS: Tea, Coffee
COMMERCIAL CROPS: Sesamum, Groundnut
Botanical name, family, useful part, chemical constituents and uses:
Condiments and Spices Cardamom, Chilies
Medicinal and Aromatic plants: Lemon grass, Cumin
General account of dyes: Henna, Indigofera, Butea

304/4

UNIT: 4

BIOSTATISTICS:

[10 Lect.]

Biometrics: Aims and objectives as applicable to biological science. Methods of data collection and
graphical representation. Measures of central tendency, Mean, median and mode
Measures of Dispersion: Range, mean deviation, standard deviation, standard error and 't' test. Chi-
square and goodness of fit. Simple Linear regression. Frequency of distribution;
Normal, binomial, Poison distribution.

GUJARAT UNIVERSITY
BOTANY
Choice Based Credit System (CBCS) Theory syllabus
Effective from June-2013
SEMESTER VI
BOTANY
BOT 305
Elective Paper: Production Horticulture

Unit-I: Fundamentals of Horticulture

Definition, branches, importance and scope, Classification of Horticultural Crops, Special horticultural practices

Unit-II: Soil and water considerations

Formation of soil, classification, physical and chemical properties. Soil media, nutrients and manuring. Symptoms of excesses and deficiencies of nutrients. Plant growth regulators.

Unit-III: Plant Propagation and Plant Protection

Propagation by specialized structures, nursery based propagation, Role of Biotechnology, pest management, Weed management

Unit-IV: Production, Packaging, Marketing and Conservation

Greenhouse cultivation, Floriculture, Root and tuber crops, Vegetable production, Organic gardening, Containers and packaging techniques, Local and international demand, export standards and potential.

Suggested readings:

Text book of horticulture – K. Manibhushan Rao , MACMILLAN India Ltd.

Basic Horticulture – Victor R. Gardner, The MACMILLAN Company, New York 1.

GUJARAT UNIVERSITY
SEMESTER V BOTANY
PRACTICALS: 306
(Algae, Fungi, Bryophytes, Pteridophytes)
Practical I : Session-1

Study of types through fresh, preserved material and permanent slides.

(a) Identify and classify following types:

ALGAE: Rivularia, Scytonema,
Coleochaete, FUNGI: Aspergillus
BRYOPHYTA: Riccia, Pellia, Sphagnum.
PTERIDOPHYTA: Psilotum (Stem), Equisetum
(Stem).

(b) Structure and Reproductive organs:

ALGAE Chara, Sargassum, Polysiphonia
FUNGI: Phytophthora, Peziza, Ustilago
BRYOPHYTA: Notothylas, Funaria &
Polytrichum: Sex organs & Capsule
PTERIDOPHYTA: Equisetum: Cones

(c) Types of Stele: chart and Permanent slides

(d) Submissions.

GUJARAT UNIVERSITY
SEMESTER V BOTANY
PRACTICALS: 306
(Systematic Botany, Angiosperms, Embryology and Anatomy)
PRACTICAL I: Session - II

ANGIOSPERMS: Study of families as per theory syllabus including floral formula and floral diagram.

EMBRYOLOGY:

- (a) Exposition and mountings of
 - a. Endosperm haustoria : Cucumis, Cassia.
 - b. Developing embryo : Mustard, Cassia
- (b) Study of permanent slides
 - a. Pollen germination on stigma
 - b. V.S. of ovule (Typical)
 - c. Embryo sac with megaspore mother cell (M M C)
 - d. Embryo sac with 2 – nucleate
 - e. Embryo sac with 4 – nucleate
 - f. Embryo sac with 8 – nucleate

ANATOMY:

1. Study of mechanical tissues and distribution of mechanical tissue through fresh / preserved material.

- A. (i) Types of Collenchyma
 - (ii) Sclerenchyma and sclereids
- B. Distribution of mechanical tissues from followings:
 - (i) Sunflower Stem
 - (ii) Nyctanthes Stem
 - (iii) Maize still root
 - (iv) Maize leaf

2. To study secretory tissue system through fresh material or permanent slides:

- (1) Orange rind
- (2) Lemon leaf
- (3) Eucalyptus leaf
- (4) Pinus needle (Resin Duct)
- (5) Cycas rachis (Mucilage Duct)

3. Study of Tracheary elements by maceration technique:

- (1) Nephrolepis rachis
- (2) Cycas rachis
- (3) Cucurbita Stem
- (4) Maize Stem

4. Study of leaf fall (Abscission layer) through permanent slide.

5. Study of Absorbing tissue system through fresh / preserved material or permanent slides.

- (1) Absorbing tissue: Orchid root
- (2) Haustorial organ: Scutellum maize grain.
- (3) Haustoria in Cuscuta.

GUJARAT UNIVERSITY
SEMESTER V BOTANY
PRACTICALS: 306
(Plant Physiology, Biochemistry, Cell Biology, Genetics)
PRACTICAL II: Session-I

PLANT PHYSIOLOGY & BIOCHEMISTRY:

1. Major experiments:

The following physiological experiments to be performed by the students and results are expected :

- (i) To determine the water potential of given tissue (Any tuber)
- (ii) Separation of amino acids in a mixture by paper chromatography & their identification by comparison with standard R_f value.
- (iii) Determine R.Q. of the given plant material of bud and or seedling.

2. Minor experiments:

The following experiments to be performed by the students:

- (i) Qualitative tests for proteins from plant material.
- (ii) Test for the presence of fats from oil seeds.
- (iii) To detect the seed viability.

Biochemistry charts as per theory syllabus.

CELL BIOLOGY:

- 1. To study mitosis in onion root tip by squash method
- 2. Histochemical localization of DNA, RNA and total protein
- 3. Electron micro photographs of following cell organelles:
 - a. Plasma membrane
 - b. Chromosome
 - c. Golgi complex

GENETICS:

Genetics problems.

GUJARAT UNIVERSITY
SEMESTER V BOTANY
PRACTICALS: 306
(Ecology, Plant Geography, Economic Botany, Biostatistics)
Practical II : Session - II

ECOLOGY:

1. Determination of Frequency (%), Density and Abundance.
2. Study of Biological Spectrum and prediction of vegetation of a given area by comparing it's biological spectrum to the normal .
3. To study following ecological instruments:
 - i. Anemometer
 - ii. Psychrometer
 - iii. Hygrometer

PLANT GEOGRAPHY:

1. To prepare map showing vegetation of Gujarat and to comment on it.
2. To prepare map of India with respect to – Major Climatic Zones, Biogeographical regions of India and to comment on it.

ECONOMIC BOTANY:

Study of various specimens as prescribed in theory syllabus.

BIOSTATISTICS:

Statistical Problems.

Submissions: Economic Botany

GUJARAT UNIVERSITY
B. Sc. Sem - V BOTANY PRACTICAL SYLLABUS
BOT 306
PRACTICAL I: Session I
(Algae, Fungi, Bryophytes, Pteridophytes)

(Maximum marks – 35)

Date:

Time: 3 hours

Q.1 Identify, classify and describe giving reasons. Draw the labeled diagrams of the peculiarities observed in Specimen A , B and C. (15)

Q.2 Expose the reproductive structure from the Specimen D. Make a sketch and show your preparation to the Examiner. (05)

Q.4 Identify and describe briefly the Slides / Specimens (08)

(E) Algae

(F) Fungi

(G) Bryophytes

(H) Pteridophytes

Q.5 Journal (02)

Q.6 Sumissions (05)

GUJARAT UNIVERSITY
B. Sc. Sem - V BOTANY PRACTICAL SYLLABUS
BOT 306
PRACTICAL I: Session II
(Systematic Botany, Angiosperms, Embryology and Anatomy)

Maximum marks – 35

Date:

Time: 3 hours

Q.1 Refer the Specimens A and B to their respective families. Giving reasons, including floral formula and floral diagrams. Draw labeled diagrams (10)

Q.2 Expose and mount _____ from the given Material C. Stain if necessary. Show your Preparation to the Examiner (05)

Q.3 Prepare a slide of Treachery elements of the given macerated material D. Describe the maceration technique. Stain if necessary . Draw the labeled diagram & show the slide to the Examiner.

OR

Make a Section of the given Plant Material D and show the distribution of mechanical tissue to the Examiner. (05)

Q.4 Identify and describe (08)
(E) Embryology
(F) Embryology
(G) Anatomy
(H) Anatomy

Q.5 Journal (02)

Q.6 Herbarium (05)

GUJARAT UNIVERSITY
B. Sc. Sem - V BOTANY PRACTICAL SYLLABUS
BOT 306
PRACTICAL II: Session I
(Plant Physiology, Biochemistry, Cell-biology, Genetics)

Maximum marks – 35

Date:

Q.1 Perform the physiological experiment assigned to you. Tabulate your observations and calculate. Show your experiments and records to the Examiner. (08)

Q.2 Perform the experiments per slip and show your results to the Examiner. (05)

Q.3 Solve the genetic problem as per the slip. (05)

Q.4 Prepare a slide showing cell division from the given specimen A. Stain if necessary & show the slide to the Examiner. Draw the labeled sketch. (07)

Identify & Describe.

Q.5 (08)

(B)Chart from Cell-Biology

(C)Chart from Biochemistry

(D)Physiology

(E)Genetics

Q.6 Journal (02)

GUJARAT UNIVERSITY
B. Sc. Sem - V BOTANY PRACTICAL SYLLABUS
BOT 306
PRACTICAL II: Session II
(Ecology, Plant Geography, Economic Botany, Biostatistics)

Maximum marks – 35

Date:

Time: 3 hours

- Q.1 To determine Abundance / Density of any five species occurring in a given area. Tabulate your observations and result show your records to the Examiner. (Draw graphs if necessary) (08)
- Q.2 Compare the Biological spectrum of the given area with the normal and predict the type of vegetation. (05)
- Q.3 Solve the statistical problem as per the slip. (04)
- Q.4 Identify & Describe: (06)
(A) Economic Botany.
(B) Economic Botany.
(C) Economic Botany.
- Q.5 Journal (02)
- Q.6 Tour report, Viva and Submissions (10)

Gujarat University
Ahmedabad
B. Sc. Botany Semester - VI
Syllabi for Botany Theory and Practical
Academic Year 2013-2014

| Unit | Botany Theory Bot-307 4 credits Total 100 marks Internal 30 Marks External 70 marks 4 hrs/week | Botany Theory Bot-308 4 credits Total 100 marks Internal 30 Marks External 70 marks 4 hrs/week | Botany Theory Bot-309 4 credits Total 100 marks Internal 30 Marks External 70 marks 4 hrs/week | Botany Theory Bot-310 4 credits Total 100 marks Internal 30 Marks External 70 marks 4 hrs/week | Botany subject elective Bot-311 2 credits Total 100 marks Internal 30 Marks External 70 marks 3 hrs/week | Botany Practical Bot-312 5 credits Total 200 marks Internal 60 Marks External 140 marks 12hrs/week |
|------|--|--|--|--|---|--|
| I | Pteridophytes | Systematic Botany | Advanced Plant Physiology | Ecology | Student has to select one subject elective course from the University approved subject elective courses. Plant Tissue Culture | There are two practicals i.e. Practical I and II. Each practical has 2 sessions (I & II), each of 3 hours |
| II | Pteridophyte fossils | Angiosperms | Plant breeding | Gardening | | |
| III | Gymnosperms | Anatomy | Molecular Biology | Ethnobotany | | |
| IV | Gymnosperms fossils | Microbiology | Biotechnology | Forestry | | |

Instructions :

- Students must go on Botanical excursion for studying vegetation in natural state.
- There must be at least one visit to a public garden to study landscape design principles.
- Project report, Excursion report, garden visit report, Permanent Slides and submission of specimens during the practical examination will be given due weightage.
- Students are expected to submit the following at the various respective examinations :
- Cryptogamic specimens, Gymnospermic specimens, Angiospermic specimens, Herbarium sheets of angiospermic plants (Minimum 10), Herbarium sheets of Ethnobotany, permanent slides(minimum five).
- Students are expected to record the work done in the laboratory in the journal.
- The journal is to be certified by the in charge teacher and Head of the department.
- Certified journals have to be produced while appearing at the time of examination.

GUJARAT UNIVERSITY
BOTANY
Choice Based Credit System (CBCS) Theory
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SEMESTER VI
BOTANY
BOT 307

(Pteridophytes, Pteridophyte fossils, Gymnosperms and Gymnosperm fossils)

307/1

UNIT: I

PTERIDOPYTES

[10 Lect.]

Comparative account of morphology and reproduction in Psilotum, Isoetes, Selaginella, Equisetum, Marsilea and Adiantum.

Structure, Reproduction and life history (excluding development):

LYCOPSIDA: Isoetes

PTEROPSIDA: Marsilea

Apospory and Apogamy

307/2

UNIT: II

PTERIDOPHYTE FOSSILS:

[10 Lect.]

Geological Time-Scale

Psilophytales: General Characters: Rhynia

Lepidodendrales: General Characters: Lepidodendron and Lepidocarpon

Calamitales: General Characters: Calamites and Calamostachys

307/3

UNIT: III

GYMNOSPERMS:

[10 Lect.]

Structure of microspores and male gametophytes

Morphology, anatomy, reproduction and life history:

GINKGOALES: Ginkgo

GNETALES: Ephedra

307/4

UNIT: IV

GYMNOSPERM FOSSILS:

[10 Lect.]

Fossils, fossilization process, types of fossils: compression, impression, petrification, coal balls, Carbon dating.

Fossil biology of Gymnosperms: General characters:

CYCADOFILICALES

Lygenopteris althamia

Corsotheca (Male organ)

BENNETTITALES

Spore bearing

organs CORDAITALES

Cordaites

Cordaitanthus

PENTOXYLALES (general account)

Economic importance of Gymnosperms

GUJARAT UNIVERSITY
BOTANY
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Effective from June-2013
SEMESTER VI
BOTANY
BOT 308
(Systematic Botany, Angiosperms, Anatomy, Microbiology)

308/1 **UNIT: I**
SYSTEMATIC BOTANY: [10 Lect.]

Principles of taxonomy, merits and demerits of system of classification of Hutchinson
Outline, merits and demerits of system of classification of Takhtajan
General account: Chemotaxonomy, Numerical taxonomy, Cytotaxonomy, Molecular taxonomy
BSI: its role in conservation of biodiversity.

308/2 **UNIT: 2**
ANGIOSPERMS: [10 Lect.]

Classification as per Bentham and Hooker with economic importance
DICOTYLEDONS:
Polypetalae: Meliaceae, Anacardiaceae, Lythraceae, Umbelliferae
Gamopetalae: Sapotaceae, Boraginaceae, Verbenaceae
Apetalae: Urticaceae, Polygonaceae
MONOCOTYLEDONS: Cannaceae

308/3 **UNIT: 3**
ANATOMY [10 Lect.]

Anomalous secondary growth:
Abnormal behavior of normal cambium
Eg. Achyranthes and Draceana stem
Accessory cambium formation and its activity
Eg. Bougainvillea, Mirabilis and Boerhaavia stem
Abnormal secondary growth in fleshy roots
Eg. Carrot, Raphanus and Beet root

Types of stele – Stellar growth

Nodal Anatomy – Unilacunar, Trilacunar, Multilacunar.

308/4 **UNIT: 4**
MICROBIOLOGY [10 Lect.]

Brief outline; Nomenclature and classification of viruses
Properties of viruses, morphology and ultra structures
(Bacteriophage) Types of bacteria; ultrastructure of bacteria
Basic principles of staining
Industrial application of microorganisms, Alcohol, Food Processing, Milk products, Antibiotics
and Biopesticides
Biofertilizers
Roles of microbes in agriculture- role in Nitrogen fixation
Biodegradation of cellulose, lignin and petroleum wastes and heavy metal waste

GUJARAT UNIVERSITY
BOTANY
Choice Based Credit System (CBCS) Theory syllabus
Effective from June-2013
SEMESTER VI
BOTANY
BOT 310
(Ecology, Gardening, Ethnobotany, Forestry)

310/1

UNIT: 1

ECOLOGY:

[10 Lect.]

Plant Biodiversity: Concepts and levels, IUCN categories of threat, Red data books, Hot spots
Brief account: EIA, International Biological Program; Man and Biosphere Program (MAB)
Climate change: Greenhouse Gases (CO₂, CH₄, N₂), CFCs: Sources, Trends and Role,
Consequences of Climate Change (CO₂, Global warming, Sea level Rise,)
Greenhouse effect and global warming; Ozone depletion;
Effect of Air, Water and Soil pollution on vegetation
Carbon footprint

310/2

UNIT: 2

GARDENING:

[10 Lect.]

Principles and Materials of Garden Design
Garden features: Paths, walkways and avenues, arches, lawn, floral beds, edges, hedges, ground
cover
Garden operations: Pruning- principles & kinds.
Plant care: Manuring. Daily care & maintenance,
repotting.
Landscape designs in India- Buddhist, Mughals, etc
Nursery management

310/3

UNIT: 3

ETHNOBOTANY

[10 Lect.]

History and development of Ethnobotany
Ethnobotany in India
Methods of Ethnobotanical research
Plants in religious belief
Plants used by tribes of Gujarat:
Achyranthes aspera
Asparagus racemosus
Butea monosperma
Calotropis procera
Ficus religiosa
Jatropha gossypifolia
Tamarandus indica
Vitex negundo

310/4

UNIT: 4

FORESTRY

Forest types of India

[10 Lect.]

Physical properties, structural features and identification of wood

Wood and Paper industries

Social forestry and Agricultural Forestry

Wild life and biosphere reserves

Forest research education and training Institutes

Forest Conservation Act (1980-1982); the Indian Wildlife (Protection) Act 1972 – Amended 1991.

GUJARAT UNIVERSITY
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Effective from June-2013
SEMESTER VI
BOTANY
BOT 311
Elective Paper: Plant Tissue Culture

Unit-I: Introduction and laboratory organisation

Definition, Origin and History of plant tissue culture, Laboratory organization (washing area, transfer area, culture area, green house) and instruments (autoclave, laminar air flow, pH meter, oven, distillation unit).

Unit-II: Techniques in plant tissue culture

Sterilization techniques (media sterilization, glassware sterilization, plant material sterilization, culture room sterilization and small instrument sterilization). Media composition and preparation, roles of various plant growth regulators(PGRs), Inoculation of the explants and maintenance of culture.

Unit-III: Types of cultures :

Seed culture, embryo culture, callus culture, organ culture, cell culture, protoplast culture.

Unit-IV: Applications of plant tissue culture :

Applications of plant tissue culture in industries, forestry, horticulture, plant breeding and agriculture.

Suggested reading:

Introduction to plant tissue culture – M. K. Razdan, Oxford and IBH publishing Co. Pvt. Ltd., New Delhi.

Introduction to Plant Biotechnology- H. S. Chawla, Oxford and IBH publishing Co. Pvt. Ltd., New Delhi.

GUJARAT UNIVERSITY
BOTANY
B. Sc. Sem - VI BOTANY PRACTICAL SYLLABUS
BOT 312
PRACTICAL I: Session I
(Pteridophytes, Pteridophyte fossils, Gymnosperms and Gymnosperm fossils)

1. Study of types through fresh preserved material and permanent slides.

(a) Identify and classify following types:

PTERIDOPHYTA: , Isoetes, Marsilea.

GYMNOSPERMS, Ginkgo, Ephedra

(b) Structure and Reproductive organs:

PTERIDOPHYTA: Isoetes: Sporophyll

Selaginella: Cones

Adiantum: Sporophyll

Marsilea: Sporocarp

GYMNOSPERMS: Ginkgo, Ephedra

2. The following Fossil Specimens and / or slides should be studied.

Pteridophytes

PSILOPHYTALES : Rhynia: Stem T.S

LEPIDODENDRALES : Lepidodendron: Stem T.S.

Lepidocarpon: V.S.Slide

CALAMITALES : Calamites: Impression, Stem, T.S.

Calamostachys: Peel / Slide, Cone L.S

Gymnosperms:

CYCADOFILICALES: Lygenopteris althamia – Stem, T.S , Corsotheca (Male

organ) CORDAITALES: Cordaites: Stem T.S

Cordianthus – L.S of Cone.

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PRACTICAL I: Session II
(Systematic Botany, Angiosperms, Anatomy, Microbiology)

ANGIOSPERMS: Study of families as per theory syllabus including floral formula and floral diagram.

ANATOMY: Study of different types of stele through charts and permanent slides.

Study of abnormal secondary growth:

- (1) Achyranthes stem
- (2) Draceana stem
- (3) Bougainvillea stem
- (4) Mirabilis stem
- (5) Boerhavia stem
- (6) Carrot root
- (7) Raphanus root
- (8) Beet root

Study of nodal anatomy as per syllabus.

MICROBIOLOGY:

- (a) Staining of bacteria through gram staining
- (b) Electron micrograph: Bacteriophage virus & Bacteria

Submissions: Herbarium sheets and Permanent Slides.

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PRACTICAL II: Session I
(Plant Physiology, Plant Breeding, Molecular Biology, Biotechnology)

PLANT PHYSIOLOGY :

1. Major experiments:

The following physiological experiments to be performed by the students and results are expected :

- (i) To study the rate of photosynthesis under different concentration of CO₂.
- (ii) To study of the rate of photosynthesis under different wavelength of light
- (ii) To study of the rate of photosynthesis under different light intensities.

2. Minor experiments:

The following experiments to be performed by the students:

- (i) Hill reactions
- (ii) C₃ & C₄ plants demonstration by anatomical features.
- (iii) Demonstration of respiratory enzymes in plant tissues.
 - (a) Polyphenol Oxidase
 - (b) Dehydrogenase
- (iv) Preparation of solutions:
Molar, Molal, Normal, Percent Concentrations

3. Demonstration Experiments:

- (i) To demonstrate the phenomenon of geotropism
- (ii) To demonstrate the phenomenon of hydrotropism
- (iii) To demonstrate the phenomenon of phototropism
- (iv) To demonstrate the phenomenon of thigmotropism

PLANT BREEDING: Charts as per theory syllabus.

MOLECULAR BIOLOGY: Charts as per theory syllabus.

BIOTECHNOLOGY: Charts as per theory syllabus.

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ECOLOGY

1. Determination of Chloride content in water sample
2. Determination of Carbonate and Bicarbonate in water sample
3. Determination of Calcium content in water sample
4. Determination of Total hardness of water sample
5. Determination of Carbonate/Nitrate deficiency from the given soil sample. (Quantitative)

GARDENING

Visit to a garden to study the principles and materials used in landscape design. Report to be submitted during practical exam.

Visit to a Nursery to study its management. Report to be submitted during practical exam.

ETHNOBOTANY

Ethnobotanical specimens as prescribed in theory syllabus.

FORESTRY

Identification and characteristics of following wood samples:

- a. Eucalyptus sp.
- b. Acacia arabica
- c. Mangifera indica
- d. Tectona grandis
- e. Shorea robusta (Sal)

Submissions: Garden and Nursery visit Report, Wood samples

Herbarium of Ethnobotanical plants

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BOT 312
PRACTICAL I: Session I
(Pteridophytes, Pteridophyte fossils, Gymnosperms and Gymnosperm fossils)

(Maximum marks – 35)

Date:

Time: 3 hours

Q.1 Identify, classify and describe giving reasons. Draw the labeled diagrams of the peculiarities observed in Specimen A, B and C. (15)

Q.2 Expose the reproductive structure from the Specimen D. Make a sketch and show your preparation to the Examiner. (05)

Q.3 Identify and describe briefly the Slides / Specimens (08)

(D) Pteridophytes

(E) Gymnosperms

(F) Pteridophyte fossils

(G) Gymnosperms fossils

Q.4 Journal (02)

Q.5 Submissions (05)

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BOT 312
PRACTICAL I: Session II
(Systematic Botany, Angiosperms, Anatomy and Microbiology)

Maximum marks – 35

Date:

Time: 3 hours

- Q.1 Refer the Specimens A and B to their respective families. Giving reasons, including floral formula and floral diagrams. Draw labeled diagrams (08)
- Q.2 Prepare a double stained preparation of given Material C. Show your Preparation to the Examiner (07)
- Q.3 D. Gram staining (04)
- Q.4 Identify and describe (04)
(E) Microbiology
(F) Anatomy
- Q.5 Journal (02)
- Q.6 Submission: Herbarium sheets and Permanent slides. (10)

Third B.Sc. BOTANY PRACTICAL SYLLABUS

BOT 312 SEMESTER VI

PRACTICAL 2: Session I

(Plant Physiology, Plant Breeding, Molecular Biology, Biotechnology)

Maximum marks – 35

Date:

Time:

- Q.1 Perform the physiological experiment assigned to you. Tabulate your observations and calculate. Show your experiments and records to the Examiner. (10)
- Q.2 Perform the experiments per slip and show your results to the Examiner. (05)
- Q.3 Identify & Describe. (08)
- (A) Physiology
(B) Chart from Plant Breeding
(C) Chart from Molecular Biology
(D) Chart from Biotechnology
- Q.4 Journal (02)
- Q.5 Project report & Viva (10)

Third B.Sc. BOTANY PRACTICAL SYLLABUS

BOT 312

PRACTICAL 2: Session II

(Ecology, Gardening, Ethnobotany, Forestry)

Maximum marks – 35

Date:

Time:

Q.1 Estimate Calcium / Chloride / Carbonate and bicarbonate /Total hardness in terms of p.p.m in a water sample given to you. Tabulate your observations and results and show them to the Examiner.

- Q.2 Test the given soil sample for Carbonate/Nitrate deficiency. (08)
- Q.3 Identify & Describe: (05)
- (A) Ethnobotany. (10)
- (B) Ethnobotany.
- (C) Wood sample.
- (D) Gardening chart
- (E) Garden chart
- Q.4 Journal (02)
- Q.5 Garden & Nursery visit report & Viva (10)

Suggested Reading

- **Biochemistry:**

Plant Biochemistry – Hans-Walter Heldt, 2004, Academic Press.

Biochemistry and Molecular Biology of Plants – Bob Buchanan, W.Gruissem & R.L. Jones. Plant Biochemistry & Molecular Biology (2nd Ed.) –P.J. Lea & R.C.Leegood John Wiley & Sons

- **Biostatistics :**

Biostatistics – P.K. Jasra & Gurdeep Raj, Krishna Prakashan Media Ltd.,Meerut.

Biostatistics- P.N. Arora & P.K. Malhan, Himalaya Publishing House.

- **Cytology:**

Cell & Molecular Biology – DeRobertis & DeRobertis

Cell & Molecular Biology – Phillip Sheeler & Donald Bianchi

Molecular and Cellular Biology – S.L. Wolfe, Wadsworth Publishing Co.

Molecular Biology of the Cell – B.Alberts, D.Bray, J. Lewis, M .Raff,

K.Roberts and J.D. Watson, Garland Publishing Inc., New York.

- **Ecology:**

Ecology and Environment (7th Ed.) – P.D.Sharma .

Ecology – N.S.Subramanyam & A.V.S.Samba Murty, Narosa Publication House, New Delhi.

A Text Book of Plant Ecology—R.S.Shukla & P.S.Chandel.

Fundamentals of Ecology – Eugene P. Odum.

Ecology (Indian Edition), Peter Russell et. al., Brooks/Cole, Cengage learning product.

Ecology and Environmental Biology, T. K. Saha, Books and Allied Pvt. Ltd. Kolkata

- **Economic botany:**

Economic Botany – Pandey & Chaddha, Vikas Publishing House Pvt. Ltd. New Delhi.

Economic Botany – N.S.Subramanyam & A.V.S.Samba Murty, Wiley Eastern Ltd..

Economic Botany – B.P. Pandey, Chand & Co., New Delhi

Economic Botany – A.F. Hill & O.P.Sharma, Tata McGraw Hill, New Delhi.

- **Ethnobotany:**

Ethnobotany – P.C.Trivedi, Aavishkar Publishers, Jaipur.

Manual of Ethnobotany – S.K. Jain, Scientific Publication, Jodhpur Ethnobotany of primitive tribes in Rajasthan – Printswell, Jodhpur.

- **Genetics:**

An Introduction to Genetics- B.K.Jain, Himanshu Publication, New Delhi

The Science of Genetics – Atherly A. G., Girton J. R. & McDonald

1999 Principles of Genetics (8th Ed) – Gardner, Simmons & Snustad

Genetics – P.K.Gupta, Rastogi Publication

Genetics (5th Ed.) – Russel P.J.

Genetics – Strickberger (McMillan)

Genetics- Pawar (Vol I & II).

Cytogenetics & Plant Breeding – Shukla & Chandel.

- **Landscape Gardening and Plant breeding:**

Gardens – Laeeq Futehally A New Course in Botany – Kumar, Pradhan, Sharma, Sarangdhar, Sheth Publishers, Mumbai.

Plant breeding : Principles and Methods, B. D. Singh, Kalyani Publisher

- **Molecular Biology & Biotechnology:**

Plant cell and tissue culture – S. Narayanswamy, Tara McGraw Hill

Pub.2004. Plant tissue culture, Applications and limitation – Bhojwani S.S.

Plant cell culture – Collins H. A. & Edwards 1998

Elements of Biotechnology – Rastogi

Publications Molecular Biology- David Freifelder

Fundamentals Of Molecular Biology – Veer Bala Rastogi.

An Introduction to Plant Biotechnology – H.S.Chawla, Oxford & IBH publishing Co.Pvt.Ltd. New Delhi, 2008

Biotechnology- U. Satyanarayana, Books and Allied (P) Ltd. Kolkata, 2008

Cell and Molecular Biology, Phillip Sheeler and Donald E.B., Wiley India

- **Plant Systematics:**

Plant systematics- G. Singh. Oxford and IBH Publishing Co. Pvt. Ltd, NewDelhi.

Advanced Plant Taxonomy – A.K. Mondal, New Central Book Agency,Kolkatta.

Taxonomy – A.K. Sharma & Rajeshwari Sharma, Pragati Prakashan,Meerut.

Plant Taxonomy – N.B.Saxena & S. Saxena, Pragati Prakashan, Meerut.

- **Lower and Higher cryptogams:**

Botany for degree students, Algae, B.R.Vashishta et.al. S. Chand & Company

Ltd. Botany for degree students, Fungi, B.R.Vashishta et.al. S. Chand &

Company Ltd. Botany for degree students, Bryophyta, B.R.Vashishta et.al. S.

Chand & Company Ltd. A text book of Botany, Singh, Pandey and Jain,

Rastogi Publication