Detailed Curriculum has been designed as per semester system. There shall be one theory paper having four units.

Contact Hours per week: 4
Exam Duration: 3 hours

Unit-1  Study of lower plants

Objective: To acquaint students with lower plants.

Algae: Spirogyra, Nostoc 3 hours
Taxonomic Position, structure of thallus, vegetative, asexual and sexual modes of reproduction of the genus, Economic importance of algae.

Fungi: Mucor, Albugo 3 hours
Taxonomic Position, structure of thallus, vegetative, asexual and sexual modes of reproduction of the genus, Economic importance of fungi.

Bryophyte: Riccia 2 hours

Pteridophyte: Nephrolepis 2 hours
Taxonomic Position, Morphology, structure of thallus, vegetative, asexual and sexual modes of reproduction of the genus, Economic importance of Pteridophytes

Suggested Readings

(iii) Algae, Fungi, Bryophyte, Pteridophyte by Vasishta., S. Chand Pub, New Delhi
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Choice Based Credit System (CBCS) Theory syllabus
Effective from June-2011

SEMESTER-I

Detailed Curriculum has been designed as per semester system. There shall be one theory paper having four units.

Contact Hours per week: 4 Exam Duration: 3hours

Unit-2 Genetics and Molecular biology

Objective: To acquaint students with the concepts of cell biology and genetics

1. DNA and RNA Composition and Structure 3 hours.
2. Watson and Crick’s model of DNA 1 hour
3. Types of RNA 1 hour
4. DNA Replication 1 hour
5. Genetic code 1 hour
6. Protein Synthesis 2 hour
7. Regulation of gene expression in prokaryotes – Operon concept 1 hour

Suggested Readings

(i) The World of Cell by Backer, Kleinsmith and Hardin Pearson Education
(ii) Elements of Cytology by C. B. Powar
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Effective from June-2011  
SEMESTER-I  

Detailed Curriculum has been designed as per semester system. There shall be one theory paper having four units.  

Contact Hours per week: 4  
Exam Duration: 3 hours  

Unit-3  Plants and environment  
Objective: To acquaint students with the concept of Ecology and Environment.  

Course content:  
1. Introduction, Scope and Branches of Ecology  
2. Ecosystems:  
   - Kinds of Ecosystem: Natural, Artificial  
   - Structure and Functions of Ecosystems  
   - Ecological Pyramids, Productivity of an Ecosystem, Energy flow in an Ecosystem  
   - Biogeochemical Cycles-Carbon, Nitrogen, Phosphorus, Sulfur, Components of Freshwater Ecosystem (Pond) Components of Terrestrial Ecosystem (Grassland)  
3. Biotic Factors:  
   - Symbiosis: Mutualism, Proto-cooperation, Commensalism  
   - Antagonism: Predation, Parasitism, Antibiosis, Competition, Saprophytism  
4. Concept of Sustainable Biodiversity:  
   - Case study: The Messenger Pigeon gone forever  

Suggested Readings  
(ii) Plants and Environment by Daubenmire (Wiley-Eastern Pvt. Ltd., New Delhi)  
(iii) Ecology and Environment by P.D. Sharma Rastogee Publication  
(iv) Basic Ecology – Eugene P. Odum  
(v) Fundamentals of Ecology- P. Odum  
(vi) Concept in Indian Ecology and Environmental Science – S. V. S. Rana  
(vii) Ecology Theories and Application – Peter Stiling  
(viii) Ecology & Environment – P. D. Sharma  
(ix) Indian Manual of Plant Ecology – R. Misra & G. S. Puri
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SEMESTER-I

Detailed Curriculum has been designed as per semester system. There shall be one theory paper having four units.

Contact Hours per week: 4  Exam Duration: 3 hours

Unit-4 Plant Biotechnology

Objective: To acquaint students with the latest technological developments in the field of Biotechnology and plant tissue culture.

1. Introduction, Brief History, Scope and Types of Plant Biotechnology  1 hour
2. Plant Tissue Culture – Tools & Technique; Applications  2 hours
3. Types of Culture- Callus, Cell  2 hours
4. Secondary Metabolites in Plant Culture  2 hours
5. Protoplast Culture and Somatic Hybridization.  2 hours
6. Applications of Plant Tissue Cultures  1 hour

Suggested Readings
(i) Biotechnology by U. Satyanarayana Books and Allied (P) Ltd
(ii) Elements of Biotechnology by P.K.Gupta, Rastogi Publications.
(iii) Plant cell and tissue culture by Narayanswamy, Tata McGraw Hill.
(v) Basic Biotechnology by S. Ignacimuthu, Tata McGraw Hill.
(vi) A Text Book of Biotechnology by R.C. Dubey, S. Chand & Co.
CBBCS BOTANY PRACTICAL SYLLABUS

SEMESTER 1:

1. Study of Algae- Spirogyra
   a) Mounting- Thallus, conjugation types
   b) P.S. - Thallus and conjugations
   Nostoc
   a) Mounting- Colony
   b) P.S. - Colony

2. Study of Fungi- Mucor
   a) Specimen- Bread/ Roti with Mucor
   b) Mounting- Reproductive structure- spores, sporangia
   c) P.S- Mucor sporangia, Zygospores
   Albugo
   a) Specimen- On host
   b) Mounting- Reproductive structures
   c) P.S- Vegetative and Reproductive structures

3. Study of Bryophytes- Riccia
   a) Specimen - Thallus with Sporophyte
   b) P.Slides – Thallus v.t.s., thallus with Antheridia and Archegonia

4. Study of Pteridophytes- Nephrolepis
   a) Specimen- Sporophytic plant
   b) Mounting- Ramenta, Hydathode, Sporangia
   c) P.S- Prothallus with Antheridia and Archegonia; T.S. leaflet passing through sorus

5. Detail study of Genetic Codes.

6. Study of Biotic Factors- examples of Symbiosis and Antagonism
   a) Symbiosis- Root nodules, Lichen
   b) Protocooperation- Hermit crab and Fierasfer fish
   c) Antagonism- Cuscuta, Loranthes, Viscum, Utricularia, Nepenthes, Drosera

7. Study of structure of Nucleic acids (DNA, RNA) through charts or models- Watson & Crick Model

8. DNA Replication and Protein Synthesis through charts or models.

   a) Laboratory design
   b) Laminar Air Flow, Autoclave, pH meter, oven, digital balance
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Choice Based Credit System (CBCS) Practical paper
Effective from June-2011
SEMESTER-I

Date:_______ Total Marks: 30
Time: 3 Hours

Q.1 Identify and describe Specimen A and B. 08
Q.2 Mount the __________ from the Specimen C. 04
Q.3 Mention the Amino Acids for the _____, ______, ______, Genetic Codes 02
Q.4 Identify and Describe the specimens 12
   Specimen D (Algae or Fungi)
   Specimen E (Bryophytes or Pteridophytes)
   Specimen F (Ecology)
   Specimen G (Ecology)
   Specimen H (Genetics)
   Specimen I (PTC)
Q.5 Journal 04

GUIDENCE FOR ARRANGEMENT OF SPECIMENS IN THE EXAMINATION.
Specimen A:  Algae or Fungi.
Specimen B:  Bryophytes or Pteridophytes.
Specimen C: Reproductive structure of Algae, Fungi, Bryophytes or Pteridophytes
or Ramenta or Hydathode may be asked.
   (Q.3 Different 5 types of sets should be prepared for each examination).
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Effective from June-2011  
SEMESTER-II

Detailed Curriculum has been designed as per semester system. There shall be one theory paper having four units.

Contact Hours per week: 4 
Exam Duration: 3 hours

Unit-1  Study of higher plants
Objective: To acquaint students with Higher plants.

Gymnosperms:
Outline Classification of Gymnosperms by Chamberlain 1 hour
Cycas 4 hours
Occurrence, distribution, taxonomic position, morphology, reproduction and life history of the genus (excluding anatomy), Indian contribution on Gymnosperms.

Angiosperms: Sunflower and Maize 5 hours
Occurrence, distribution, taxonomic position, morphology, reproduction and life history of the genus (excluding anatomy).

Suggested reading:

(vi) Botany for degree students- Vol. V, Gymnosperm by P. C. Vasishta (S. Chand, Delhi)
(vii) Gymnosperm by G. L. Chopra (S. Nagin & Co., Jullundhar)
(viii) Gymnosperm by Vasishta (S. Chand, Delhi)
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Choice Based Credit System (CBCS) Theory syllabus  
Effective from June-2011  
SEMESTER-II  
Detailed Curriculum has been designed as per semester system. There shall be one theory paper having four units.

Contact Hours per week: 4  
Exam Duration: 3 hours

**Unit-2  Morphology and Taxonomy**

Objective: To acquaint students with basic morphology and physiology of higher plants.

1. Morphology  

   1. Bracts and Inflorescence:
      - Bracts – Scaly, Involucral, Foliaceous, Petaloid and Spathe, Inflorescence:
      - Racemose – Raceme Spike, Catkin, Spadix, Umbel, Capitulum
      - Cymose – Solitary terminal, Solitary axillary, Helicoid, Scorpioid, Biparous, Multiparous cymes.
      - Special Types of Inflorescences: Hypanthodium, Verticillaster, Cyathium

2. Taxonomy

To enable students to understand systematic botany of higher plants with the economic importance of plants.

Outline Classification of Bentham and Hooker’s System of Classification.  

Detailed study of the following families:

<table>
<thead>
<tr>
<th>Family</th>
<th>4 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malvaceae</td>
<td></td>
</tr>
<tr>
<td>Convolvulaceae</td>
<td></td>
</tr>
<tr>
<td>Nyctaginaceae</td>
<td></td>
</tr>
<tr>
<td>Amaryllidaceae</td>
<td></td>
</tr>
</tbody>
</table>

**Suggested Readings**

1. Plant Systematics, Gurucharan Singh, Oxford & IBH.
3. Taxonomy of Angiosperms, B. P. Pandey, S. Chand Publication.
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Choice Based Credit System (CBCS) Theory syllabus
Effective from June-2011

SEMESTER-I

Detailed Curriculum has been designed as per semester system. There shall be one theory paper having four units.

Contact Hours per week: 4  Exam Duration: 3 hours

Unit-3  Plant physiology and growth and development

Objective: To acquaint students with basic physiology of higher plants and related organelles.

1. Structure and Functions of Chloroplast and Mitochondria 1 hour
2. Plant-Water Relations: Water Potential, 4 hours
   - Diffusion,
   - Imbibition,
   - Osmosis,
   - Plasmolysis
3. Respiration and Photosynthesis. 2 hours
4. Physiology of Flowering:
   - Role of temperature in flowering (Vernalization)
   - Role of light in flowering (Photoperiodism)
5. Transpiration 1 hour

Suggested Readings

(i) Plant Physiology  by  S Mukherji and A K Ghosh, New Central Book Agency(P) Ltd
(iii) Plant Physiology and Biochemistry by S.K. Verma, S. Chand & Co.
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Effective from June-2011

SEMESTER-II

Detailed Curriculum has been designed as per semester system. There shall be one theory paper having four units.

Contact Hours per week: 4
Exam Duration: 3hours

Unit-4 Plant resources, utilization, horticulture and gardening

Botanical name, common name, family, useful part, brief description, important chemical constituents if any, climate and cultivation (only for cereals, pulses and oil seeds) and uses of the following plants:

1. Cereals- Wheat, Rice
2. Pulses- Gram, Pea
3. Oil seeds- Castor
4. Medicinal plants- Ginger, Aloe, Neem and Ashwagandha

Horticulture and Gardening

1. Horticulture: Definition, Scope and Branches 1 hour
2. Gardening: Introduction, Uses of gardens, Types of gardens 1 hour
   (Kitchen garden, water garden, rock garden and terrace garden)
3. Garden Operations- digging, planting 1 hour
4. Identification of common plants for different garden locations 2 hours
   (Minimum 5 plants for each location): paths, avenue, hedges and flower beds.
5. Cutting, Layering and grafting methods of asexual plant propagation 1 hour

Suggested Readings

(i) Economic Botany by V. Verma
(ii) Economic Botany of the Tropics by S.L.Kochhar
(iv) Gardening in India – Percy Lancaster, Oxford & IBH Publishing Co. Pvt Ltd.
(v) Gardens – Laeeq Futehally, National Book Trust, India.
(vi) Economic Botany by A.V.S.S. Samba Murty and N.S. Subramanyam, Wiley Eastern
CBCS BOTANY PRACTICAL SYLLABUS

SEMESTER-II

1. Study of Gymnosperms- Life-History of Cycas
   a) Specimen- Cycas whole plant, coralloid roots, compound leaf, male cone, Megasporophyll and ovules
   b) Mounting – Cycas microspores
   c) Permanent slides- TS Microsporophyll, LS Ovule

2. Study of Angiosperms - Life-History of Sunflower
   a) Specimen – Whole plant, Inflorescence, Root System
   b) Slides – Ray floret and Disc floret

Life-History of Maize
   a) Specimen – Whole plant, Inflorescence, Seed , Root system
   b) Slides – LS of Seed

3. Study of Plant Morphology:
   a) Types of Bracts- Foliaceous, Involucral, Spathe, Petalloid
   b) Types of Inflorescences including Special types
      i) Racemose- Raceme, Spike, Spikelet, Catkin, Umbel, Capitulum
      ii) Cymose – Solitary –Terminal and Axillary; Monochasial- Helicoid
         and Scorpioid; Dichasial and Multichasial
      iii) Special types- Verticillaster, Cyathium, Hypanthodium

1. Study of Plant families- Malvaceae, Convolvulaceae, Nyctaginaceae and Amaryllidaceae - Classification with reasons, Identifying characters, floral formula and floral diagrams, habit sketch, androecium, gynoecium and TS of ovary; 3-4 botanical and common names of examples.

5. Cell Biology and Plant Physiology- Experiments for-
   a) Diffusion- Saffranin or Potassium permanganate in water,
   b) Imbibition- Demonstration of Endosmosis, Exosmosis in grapes
   c) Osmosis- Potato osmoscope
   d) Plasmolysis- Tradescantia leaf
   e) Transpiration- Four Leaf , Comparision of Stomata of Monocot andDicot
   f) Study of structure of Chloroplast and Mitochondria through charts or models

6. Economic Botany- Study of plants as per theory syllabus

7. Study of Garden tools as per theory syllabus through charts- Scissors, Hoe, Hose, Clippers, Watering can, Sprinkler

8. Study of any five Avenue trees, five ornamentals and five foliage plants of your area through fresh specimen and herbaria.
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BOTANY
Choice Based Credit System (CBCS) Practical paper
Effective from June-2011
SEMESTER-II

Date:______ Total Marks:____
Time: 3 Hours

Q.1 Identify and describe Specimen A. 04
Q.2 Mount the ________ from the Specimen B. 04
Q.3 Identify the Family of the Specimen C, classify it, give general characters and draw labeled diagrams. 04
Q.4 Perform the physiological experiment as per the chit. 04
Q.5 Identify and describe the specimens 10
   Specimen D (MORPHOLOGY)
   Specimen E (MORPHOLOGY)
   Specimen F (CELLBIOLOGY)
   Specimen G (ECONOMIC BOTANY)
   Specimen H (GARDEN TOOLS)
Q.6 Journal 04

GUIDENCE FOR ARRANGEMENT OF SPECIMENS IN THE EXAMINATION.

Specimen A: Gymnosperm or Angiosperm.
Specimen B: Gymnosperm or Angiosperm.
Gujarat University, Ahmedabad

Elective paper: Forestry

Unit-I: Forest types and management
Types, role and necessity, Agroforestry, Plantation Forestry, Social Forestry, Joint Forest Management, Modern Nursery Technology

Unit-II: Silviculture
General Principles, Systems, Natural and Artificial regeneration of Forest, Tree Physiology and Breeding, Silviculture for Mangroves and Shoreline Vegetation, Traditional and recent advances

Unit-III: Ecology of Soils and Hydrology
Forest Soils, Soil conservation, Watershed management, Reclamation of degraded problem areas and integrated technology for eroded soils.

Unit-IV: Conservation and utility
Environmental forestry and conservation, Forest Ecology and Ethnobotany, Forest Resources and Utilization, Forest Protection and Wildlife Biology, Forest Economics and Legislation

Suggested Readings:
1. Botany in forestry and environment: Ashok Kumar, Published by: Kumar Media(P) Ltd., Gandhinagar, ISBN: 81-900502-0-6
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 reading:

Gujarat University, Ahmedabad

Elective Paper: Medicinal Plants

Unit -I  Classification and distribution

Classification based on botany, plant parts, phytochemicals and diseases,
Distribution in the state, country and global

Unit -II  Cultivation and utilization

Methods of cultivation, harvesting, storage and utilization (preparation)
Different systems of medicine

Unit -III  Medicinal plants and uses

Family wise (at least three plants from each family) medicinal plants,
major phytochemicals and use

Unit -IV  Value addition

Photochemistry, biosynthetic relationships, extract analysis and modern
approaches

Suggested reading:

2. Pandey C. N. et al Medicinal Plants of Gujarat, GEER Foundation and
   Gandhinagar (2005)
Gujarat University, Ahmedabad
Elective Paper: Soil and Plant Nutrition

Unit - I  Importance and Soil Characteristic
Importance, origin, classification and characteristics of soil

Unit -II  Soil testing and amendments
Soil sampling, analysis and fertility, Fertilizers, chemical- organic, conservation

Unit -III  Plant nutrition
Essential elements, deficiency symptoms, soil-root-microbe interaction, biological nitrogen fixation

Unit –IV  Modern approaches
Soil-less cultures, nutrient solution, mycorrhiza, plant assimilation, tillage and sustainable agriculture

Suggested reading: