

Krantiguru Shyamji Krishna Verma

**Kachchh University**

Mundra Road

**BHUJ : 370 001**



SYLLABUS ( CBCS )

**B. Sc. Semester III**

**Botany**

Code : botany – 303, 304

With effect from June 2012



# **KSKV Kachchh University, Bhuj - Kachchh**

Botany Syllabus as CBCS System

**Semester III** (w.e.f. June 2012)

Name of the Course: **Cryptogamic Botany**

Code: **Botany- 303**

**Unit – 1      Algae      [ 15 Marks]**

- A Classification (As per G.M. Smith)
- B Habitat, Habit and life histories of following algae.
  - (1) Cyanophyta : Nostoc
  - (2) Chlorophyta : Oedogonium
  - (3) Rhodophyta : Batrachospermum

**Unit – 2      Fungi      [ 15 Marks]**

- A Classification (As per Anisworth)
- B Habitat, Habit and life histories of following fungi
  - (1) Ascomycotina : Peziza
  - (2) Basidiomycotina : Puccinia
- C Types of Lichen

**Unit – 3      Bryophytes      [ 15 Marks]**

- A Classification (As per G.M. Smith)
- B Habitat, Habit and life histories of following bryophytes.  
(Development of organs are excluded)
  - (1) Anthocerotaceae: Anthoceros
  - (2) Musci: Funaria

**Unit – 4      Pteridophytes      [ 15 Marks]**

- A Classification (As per G.M. Smith)
- B Habitat, Habit and life histories of following Pteridophytes  
(Development of organs are excluded)
  - (1) Calamophyta: Equisetum
  - (2) Pterophyta: Adiantum

# **KSKV Kachchh University, Bhuj - Kachchh**

Botany Syllabus as CBCS System

**Semester III** (w.e.f. June 2012)

Name of the Course: **Cryptogamic Botany**

Code: **Botany- 303 [PRACTICAL]**

**1. Study of Algae:-**

- (i) *Nostoc*: Mounting of Vegetative thallus, Akinite and Heterocyst.
- (ii) *Oedogonium*: Mounting of vegetative thallus, Cap cell, Macrandrous Antheridia, Oogonium, Dwarf male (Nannandrium)
- (iii) *Batrachospermum*: Mounting of vegetative thallus, Cystocarp.

**2. Study of Fungi:-**

- (i) *Peziza*: Mounting of Apothecium and Ascus  
Permanent slides of Apothecium V.S. (Ascus).
- (ii) *Puccinia*: Mounting of Uredospore and Teleutospore.  
Permanent slides of Uredospore, Teleutospore (Teliospore), Pycniospore (Spermatospore / Spermatia) and aecidiospore.

**3. Study of Bryophytes:-**

- (i) *Anthoceros*: Specimen of Thallus, Sporophyte LS & TS  
Permanent slides or charts of V.S. of thallus, Reproductive organs.
- (ii) *Funaria*:- Mounting of Antheridia, Archegonia, Peristomial teeth.  
Specimen:- *Funaria* gametophyte with sporophyte  
Permanent slides of Antheridia, Archegonia, Sporophyte LS

**4 Study of Pteridophytes:-**

- (i) *Equisetum*: Specimen of sporophytic plant  
Permanent slides: *Equisetum* cone L.S. & T.S.  
Mounting of *Equisetum* spores from cone.
- (ii) *Adiantum*: Specimen of sporophytic plant  
Permanent slide of T.S. Passing through sori of *Adiantum* leaflet, TS of Rachis & Rhizome  
Mounting of sporangia of *Adiantum*

**Suggested Readings:**

- (i) Practical Botany Vol. I by Bendre & Kumar, Rastogi publication.

# **KSKV Kachchh University, Bhuj - Kachchh**

Botany Syllabus as CBCS System

**Semester III** (w.e.f. June 2012)

Name of the Course: **Cryptogamic Botany**

Code: **Botany- 303**

## **Session-I**

**Date:**\_\_\_\_\_

**Total Marks: 15**

**Time: 3 Hours**

Q.1	Identify and classify with reasons Specimen <b>A</b> and <b>B</b>	05
Q.2	Identify and describe peculiarities of given specimen <b>C</b> and <b>D</b>	05
Q.3	Viva voce	05

## **Session-II**

**Date:**\_\_\_\_\_

**Total Marks: 15**

**Time: 3 Hours**

Q.1	Expose the reproductive organ from given specimen <b>E</b> . Prepare the temporary slide and show it to the examiner.	04
Q.2	Identify and describe the specimens / slides <b>F</b> & <b>G</b>	04
Q.3	Project Report or Submission	04
Q.4	Journal	03

**KSKV Kachchh University, Bhuj - Kachchh**

Botany Syllabus as CBCS System

**Semester III** (w.e.f. June 2012)

Name of the Course: **Cryptogamic Botany**

Code: **Botany- 303**

## **Key to Practical Exam**

### **Session-I**

- Q.1 Specimen **A** and **B**—Algae, Fungi, Bryophytes & Pteridophytes
- Q.2 specimen **C** and **D**—Algae, Fungi, Bryophytes & Pteridophytes
- Q.3 Viva voce

### **Session-II**

- Q.1 Specimen **E**—Algae, Fungi, Bryophytes & Pteridophytes
- Q.2 Specimens / slides **F** & **G**—Algae, Fungi, Bryophytes & Pteridophytes
- Q.3 Project Report or Submission
- Q.4 Journal



- (1) Mendelian genetics
- (2) Mono & Di-hybrid ratio
- (3) Interaction of genes: Complementary Supplementary, genes.
- (4) Cytoplasmic inheritance (Mirabilis)
- (5) Sex determination in plants

# KSKV Kachchh University, Bhuj - Kachchh

Botany Syllabus as CBCS System

**Semester III** (w.e.f. June 2012)

Name of the Course : Gymnosperms, Systematic Botany & Cyto-genetics

Code: **Botany- 304 [PRACTICAL]**

## **Unit-1 Gymnosperm**

- (i) Pinus
  - Mounting of Pollengrain
  - T.S. of Pinus needle.
  - Specimens: Male cone, Female cone, Needle
  - Permanent slides: Ovule, Needle, male cone L.S.

## **Unit-2 Morphology and Taxonomy**

- (i) Morphology specimens as per theory syllabus.
- (ii) Study of Families as per theory syllabus.

## **Unit-3 Cell Biology**

Study through Model / Chart / Computer (Picture/ Photograph)

- (i) U.S. of Plant cell
- (ii) U.S. of Plant cell wall
- (iii) U.S. of Plant cell ER
- (iv) U.S. of Plasma membrane
- (v) Microbodies (Peroxisome, Glyoxisome)
- (vi) Cytoskeleton

## **Unit-4 Genetics**

- (i) Study through Model / Chart / Computer (Picture/ Photograph) as per syllabus
- (ii) Genetical problems ( as per appendix)

### **Suggested Readings:**

- (i) Practical Botany vol. I & II By Bendre and Kumar, Rastogi publication

# **KSKV Kachchh University, Bhuj - Kachchh**

Botany Syllabus as CBCS System

**Semester III** (w.e.f. June 2012)

Name of the Course: Gymnosperms, Systematic Botany & Cyto-genetics

Code: **Botany- 304**

## **Session-I**

**Date:** \_\_\_\_\_

**Total Marks: 15**

**Time: 3 Hours**

Q.1	Identify and Expose reproductive structure of given Specimen <b>A</b>	03
Q.2	Identify and classify giving general characters of the given family from specimen <b>B &amp; C</b>	04
Q.3	Identify and describe morphology of <b>D &amp; E</b>	03
Q.4	Viva voce	05

## **Session-II**

**Date:** \_\_\_\_\_

**Total Marks: 15**

**Time: 3 Hours**

Q.1	Identify and describe specimen <b>F, G &amp; H</b>	06
Q.2	Solve genetic problem	03
Q.3	Project or Submission	03
Q.4	Journal	03

# **KSKV Kachchh University, Bhuj - Kachchh**

Botany Syllabus as CBCS System

**Semester III** (w.e.f. June 2012)

Name of the Course: Gymnosperms, Systematic Botany & Cyto-genetics

Code: **Botany- 304**

## **Key to Practical Exam**

### **Session-I**

- Q.1 Specimen **A**-- Gymnosperm
- Q.2 Specimen **B & C** -- Family
- Q.3 Specimen **D & E** -- Morphology
- Q.4 Viva voce

### **Session-II**

- Q.1 Specimen **F, G & H**—Cell biology & Genetics
- Q.2 Solve genetic problem
- Q.3 Project or Submission
- Q.4 Journal

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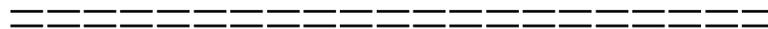
SYLLABUS ( CBCS )

**B. Sc. Semester IV**

**Botany**

Code : botany – 405, 406

With effect from June 2012



# **KSKV Kachchh University, Bhuj - Kachchh**

F.Y. B.Sc. (Botany) Syllabus as CBCS System

**Semester IV** (w.e.f. June 2012)

Name of the Course : **Anatomy, Embryology, Physiology & Biochemistry**

**Code: Botany- 405**

- Unit – 1      Anatomy :** **[ 15 Marks]**
- (1) Tissue system – Epidermal, Secretary & Mechanical
  - (2) Growth – Anomalous primary growth in Nyctanthes stem and Anomalous secondary growth in Salvadora stem & Tinospora aerial root
- Unit – 2      Embryology :** **[ 15 Marks]**
- (1) Structure of Anther
  - (2) Microsporogenesis
  - (3) Formation of pollen grains (Male gametophyte)
  - (4) Pollen germination (Pollen tube growth)
  - (5) Structure of pistil
  - (6) Megasporogenesis
  - (7) Embryo sac & its types (Female gametophyte)
  - (8) Pollination
  - (9) Fertilization (Double fertilization)
- Unit – 3      Physiology :** **[ 15 Marks]**
- (1) Plant and water relation : Properties of water, absorption of water, path of water movement (through root)
  - (2) Transpiration: Definition, types, mechanism of transpiration, factors affecting & significance.
  - (3) Respiration : Types, Glycolysis, TCA cycle, ETS, (in mitochondria)
- Unit – 4      Biochemistry :** **[ 15 Marks]**
- (1) Protoplasm as a colloidal system
- Classification, properties and biological role of followings
- (2) Carbohydrates
  - (3) Lipids

# KSKV Kachchh University, Bhuj - Kachchh

Botany Syllabus as CBCS System

**Semester IV** (w.e.f. June 2012)

Name of the Course : **Anatomy, Embryology, Physiology & Biochemistry**

Code: **Botany- 405 [PRACTICAL]**

## **Unit-I Anatomy**

- (i) To Study of Epidermal tissues : Epidermis
- (ii) To Study of Epidermal tissues : Stomata
- (iii) To Study of Epidermal tissues: Different types of trichomes and hairs.  
[Fresh material / Charts/ Pictures]
- (iv) To Study of Mechanical Tissue system
- (v) To Study of secretory Tissue system.: Glands , Nectaries
- (vi) To Study of secretory Tissue system.: Resin and oil ducts
- (vii) To Study of secretory Tissue system : Laticiferous ducts, Hydathodes
- (viii) To Study of Anomalous primary growth in Nyctanthes stem
- (ix) To study Double stain temporary preparation of Anomalous secondary growth in Salvadora stem & Tinospora aerial root

## **Unit 2 Embryology**

- (i) To study structure of anther
- (ii) To study of pollen grains
- (iii) To Study of pollen germination
- (iv) To study Ovules through Permanent slides / charts
- (v) To study embryosac through Permanent slides / charts

## **Unit – 3 Physiology :**

- (i) Demonstration practical Conduction of water through xylem.
- (ii) Demonstration of stomatal transpiration by four leaves method
- (iii) To compare the rate of transpiration from leaf surfaces by Cobalt Chloride method
- (iv) To demonstrate the rate of transpiration by using Potometer
- (v) To demonstrate anaerobic respiration in germinated seeds
- (vi) To demonstrate fermentation by Kuhne's tube

## **Unit – 4 Biochemistry :**

- (i) Agar-agar (Sol & Gel)
- (ii) Histochemical test of Carbohydrate (starch, glucose and Lignin)
- (iii) Histochemical test of Lipid.

# KSKV Kachchh University, Bhuj - Kachchh

Botany Syllabus as CBCS System

**Semester IV** (w.e.f. June 2012)

Name of the Course : Anatomy, Embryology, Physiology & Biochemistry

Code: **Botany- 405 [PRACTICAL]**

## Session-I

**Date:** \_\_\_\_\_

**Total Marks: 15**

**Time: 3 Hours**

Q.1	Take T. S. and prepare a double stained slide of given specimen <b>A</b>	03
Q.2	Expose pollen grain and germinate in proper media from specimen <b>B</b>	03
Q.3	Mount & Identify specimen <b>C &amp; D</b>	04
Q.4	Viva voce	05

## Session-II

**Date:** \_\_\_\_\_

**Total Marks: 35**

**Time: 3 Hours**

Q.1	Set up the physiological experiment <b>E &amp; F</b> assigned to you and show your results to the examiner	06
Q.2	Perform the biochemical tests of the specimen <b>G</b>	03
Q.3	Project or submission	03
Q.4	Journal	03

# **KSKV Kachchh University, Bhuj - Kachchh**

Botany Syllabus as CBCS System

**Semester IV** (w.e.f. June 2012)

Name of the Course : Anatomy, Embryology, Physiology & Biochemistry

Code: **Botany- 405 [PRACTICAL]**

## **Key to Practical Exam**

### **Session-I**

- Q.1 Specimen **A** -- Secondary growth
- Q.2 Specimen **B** -- Embryology
- Q.3 Specimen **C & D** -- Tissue system
- Q.4 Viva voce

### **Session-II**

- Q.1 Experiment **E & F** -- Physiology
- Q.2 Specimen **G** -- Biochemistry
- Q.3 Project or submission
- Q.4 Journal

# KSKV Kachchh University, Bhuj - Kachchh

F.Y. B.Sc. (Botany) Syllabus as CBCS System

Semester IV (w.e.f. June 2012)

Name of the Course: Ecology, Plant Resources & Applied Botany

Code: **Botany- 406**

**Unit – 1 Plant Ecology : [ 15 Marks]**

- (1) Ecology Definition
- (2) Levels of Organisation:- Characteristics & Ecological Hierarchy [ Definition & Introduction only]
- (3) Environment :
  - a. Introduction to tropo – strato – meso – iono & exosphere  
Introduction to hydro & lithosphere
  - b. Environmental factors  
[Edaphic (Abiotic) & Biotic factors in detail]

Abiotic (i) Climatic  
(ii) Topographic  
(iii) Edaphic

Biotic – (i) Positive Interaction  
(ii) Negative interaction

**Unit – 2 Ecosystem : [ 15 Marks]**

- (1) Definition, Processes, Kinds/Types, Structure:- Abiotic Components & Biotic Components, Productivity, Food chains & food web [self work]
- (2) Ecological pyramids
- (3) Flow of energy
- (4) Bio-Geochemical Cycles [C, N, O]
- (5) Natural Ecosystem:- Estuarine, Grassland ecosystem

**Unit – 3 Plant Resources: [ 15 Marks]**

Botanical names, family, morphology, sources & economic importance.

- (1) Plant fibers – Cotton, jute, Coir
- (2) Oils – Mustard, Groundnut, Coconut
- (3) Perfumes & Cosmetics – Citronella, Vetaveria, Jasmine
- (4) Dyes – Curcuma, Butea, Indigofera, Lawsonia
- (5) Insecticides – Neem, Chrysanthamum, Nicotiana
- (6) Ornamental plants – Seasonal : Aster, Celosia  
-- Perrenial : Acalypha, Dieffenbachia  
-- Cacti/Succulent – Opuntia, Agave  
-- Climbers – Bougainvillea, Quisqualis

**Unit – 4 Applied botany (Advance techniques in Botany) [ 15 Marks]**

- (1) Remote Sensing
- (2) Plant improvement methods
- (3) Horticulture

- (4) Floriculture
- (5) Bonsai
- (6) Plant tissue Culture
- (7) Biofertilizers
- (8) Herbarium techniques

# **KSKV Kachchh University, Bhuj - Kachchh**

Botany Syllabus as CBCS System

**Semester IV** (w.e.f. June 2012)

Name of the Course : **Ecology, Plant Resources & Applied Botany**

Code: **Botany- 406 [PRACTICAL]**

## **Unit – 1 : Plant Ecology :**

Study through Experiments (i), Chart / Picture / Model / Specimens (ii) of Inter specific interactions

- (i) Study of soil pH, Texture
- (ii) Positive Interaction
- (iii) Negative interaction

## **Unit – 2 : Ecosystem :**

Study through Chart / Picture / Model / Specimens Inter specific interactions

- (i) Heterotrophic nutrition in plant specimens
- (ii) Food chains & food web
- (iv) Ecological pyramids
- (v) Flow of energy
- (vi) Bio-Geochemical Cycles

## **Unit – 3: Plant Resources:**

Study through Chart / Picture / Model / Specimens Inter specific interactions  
Botanical names, family, morphology, sources & economic importance.

- (i) Plant fibers – Cotton, jute, Coir
- (ii) Oils – Mustard, Groundnut, Coconut
- (iii) Perfumes & Cosmetics – Citronella, Vetaveria, Jasmine
- (iv) Dyes – Curcuma, Butea, Indigofera, Lawsonia
- (v) Insecticides – Neem, Chrysanthamum, Nicotiana
- (vi) Ornamental plants – Seasonal : Aster, Celosia
  - Perrenial: Acalypha, Dieffenbachia
  - Caeti/Sncculent – Opuntia, Agave
  - Climbers – Bougainvillea, Quisqualis

## **Unit – 4: Applied botany (Advance techniques in Botany)**

Study through Chart / Picture / Model / Specimens Inter specific interactions

- (i) Remote Sensing
- (ii) Plant improvement methods
- (iii) Horticulture
- (iv) Floriculture
- (v) Bonsai
- (vi) Plant tissue Culture
- (vii) Biofertilizers
- (viii) Herbarium techniques

# **KSKV Kachchh University, Bhuj - Kachchh**

Botany Syllabus as CBCS System

**Semester IV** (w.e.f. June 2012)

Name of the Course : **Ecology, Plant Resources & Applied Botany**

Code: **Botany- 406 [PRACTICAL]**

## **Session-I**

**Date:** \_\_\_\_\_

**Total Marks: 15**

**Time: 3 Hours**

- |     |   |    |
|-----|---|----|
| Q.1 | Identify and write botanical names, families, useful parts, chemical components and uses of the given specimens <b>A</b> and <b>B</b> | 04 |
| Q.2 | Identify and describe <b>C &amp; D</b>  | 04 |
| Q.3 | Project or Submission   | 03 |
| Q.4 | Viva voce   | 04 |

## **Session-II**

**Date:** \_\_\_\_\_

**Total Marks: 15**

**Time: 3 Hours**

- |     |   |    |
|-----|---|----|
| Q.1 | Identify and write botanical names, families, useful parts, chemical components and uses of the given specimens <b>E</b> and <b>F</b> | 04 |
| Q.2 | Identify and describe <b>G &amp; H</b>  | 04 |
| Q.3 | Project or Submission   | 04 |
| Q.4 | Journal   | 03 |

# KSKV Kachchh University, Bhuj - Kachchh

Botany Syllabus as CBCS System

Semester IV (w.e.f. June 2012)

Name of the Course : Ecology, Plant Resources & Applied Botany

Code: **Botany- 406 [PRACTICAL]**

## Key to Practical Exam

### Session-I

- Q.1 Specimens **A** and **B** -- Plant resources  
Q.2 Identify and describe **C** & **D** -- Ecology, Ecosystem  
  
Q.3 Project or Submission  
Q.4 Viva voce

### Session-II

- Q.1 Specimens **E** and **F** -- Plant resources  
Q.2 Identify and describe **G** & **H** -- Applied botany  
Q.3 Project or Submission  
Q.4 Journal

### The Structure of the Question Paper for the “University Exam”

Total Marks : 60

Total No. of Questions : 04

Question No.	Sub-question	Question type	Marks
<b>Que-1</b> Unit-1	a	Short questions (No internal Options)	05
	b	Descriptive Questions with Internal Option	10
<b>Que-2</b> Unit-2	a	Short questions (No internal Options)	05
	b	Descriptive Questions with Internal	10

		Option	
<b>Que-3</b> Unit-3	a	Short questions (No internal Options)	05
	b	Descriptive Questions with Internal Option	10
<b>Que-4</b> Unit-4	a	Short questions (No internal Options)	05
	b	Descriptive Questions with Internal Option	10

- The examination pattern of the university is 60% external and 40% internal.
- Types of questions for **section A** may be varied like: one line answers / two line answers / definitions / reasoning / drawing small figures / fill in the blanks / multiple choice question / match the pairs etc. without any type of option.
- Types of questions for **section B** may be varied like: Full question, Short notes, labeled diagrams etc. with internal option.
- Each theory paper will have 4 lectures in a week and a practical will have 6 lectures per batch in a week.
- For the Practical, the practical batch must not exceed 20 students.
- The Botanical Excursion is highly essential for studying vegetation in its natural state. There shall be at least one Botanical Excursion.
- This is compulsory to record laboratory work in the Journal. The Journal is to be certified by the in charge concerned and the Head of the Department. Certified journal have to produced while appearing at the time of Practical examination
- Excursion report and submission of specimens / Submission of Project work will be mandatory for all the students.
- Minimum length of the submission is printed five A4 size pages.

### **Reference Books:-**

- **A Handbook of Medicinal Plants**, Prajapati, Purohit Sharma & Kumar
- **A Text Book of Botany Vol I & II**, by Ganguli, Das & Dutta
- **A Text Book of Botany Vol I & II**, by Ganguli, Das & Dutta
- **A Text Book of Botany Vol I & II**, by Pandey S.N. , Mishra S.P. & Trivedi P.S.
- **A Text Book of Botany Vol I & II**, by Pandey S.N. , Mishra S.P. & Trivedi P.S.
- **A Text Book of Botany, by Ganguli & Kar**
- **A Text Book of Botany, by Ganguli & Kar**
- **A Text Book of Plant Anatomy**, by P.C. Vashishta
- **A Text Book of Plant Physiology, Biochemistry & Biotechnology**, S.k.Verma & Mohit Verma
- **A Text Book of Plant Physiology**, by V. Verma
- **A Text Book of Systematic Botany**, by R.N. Sutariya

- **Algae, Fungi, Brayophata, Pteridophyta**, by B.P.Pandey
- **Algae, Fungi, Brayophata, Pteridophyta**, by B.R.Vashshta
- **Basic Ecology**, by Eugene P. Odum
- **Biochemistry**, by Powar C.B.
- **Books for FY & SY Botany**, by Nirav Publication
- **Cell biology, genetics and Evolution** by N.Arumugon, Saras Publication, Kanyakumari.
- **Cell Biology, Genetics, Ecology and Evolution**, by Verma P.S. , Agarwal V.K.
- **Cell Biology, Genetics, Ecology and Evolution**, by Verma P.S. , Agarwal V.K.
- **College botany** vol. I to IV by S. Sundarrajan Himalaya Publishing House.
- **College Botany**, by A.C. Datta
- **College Botany**, by B.P. Pandey
- **Cryptogamic Botany Vol I &II**, by G.M.Smith
- **Cytogenetics**, by S. Sundara Rajan
- **Cytology, Genetics & Evolution**, by Gupta P.K.
- **Ecology and Environment** by P.D. Sharma S. Chand and co.
- **Economic Botany** by S. Sen, New Central publication
- **Economic Botany** by Verma Emkay Publication, Delhi
- **Elements of Cytology**, by Powar C.B.
- **Embryology** by Bhojwani and Bhattnagar, Rastogi Publication.
- **Ethnobiology**, by Rajiv K. Sinha & Sweta Sinha
- **Flora of Gujarat**, by G.L.Shah
- **Flora of Saurashtra**, by Bole & Pathak
- **Flora of Saurashtra**, by Shantapau S. J.
- **Flora of the Indian Desert**, by M.M.Bhandari
- **Fundamental of Biochemistry**, by J.L.Jain
- **Fundamentals of Plant Physiology**, by V.K.Jain
- **Gymnosperm**, by Vashishta
- **Introductory Mycology**, by Alexopoulos & Mims
- **Kachchh Swasthan ni Vanshpatio**, by J.I.Thakar
- **Medicinal Herbs & Flowers**, by S.K. Bhattacharjee
- **Plant anatomy** by Pijush Roy, New Central Book Agency, Calcutta
- **Plant Anatomy**, by B.P.Pandey
- **Plant Anatomy**, by K. Esau
- **Plant Anatomy**, by K.P.Saxena
- **Plant Anatomy**, by P.J. Chandulkar
- **Plant Physiology** by Verma Emkay Publication
- **Plant Physiology** by Verma S. Chand and Co.
- **Plant Physiology**, by S.N. Pandey & B.K.Sinha
- **Plant Physiology-Fundamentals & Applications**, Kumar & Purohit
- **Practical Botany**, Vol I & II, Bendre & Kumar
- **Taxonomy of Vascular Plants**, by George H.M. Lawrence
- **Vanaspatishastra**, J.I.Thakar
- **Books of Library**
- **Internet**