



# **SAURASHTRA UNIVERSITY**

**Accredited Grade 'A' by NAAC (CGPA 3.05)**

**Syllabus on the bases of Choice Based Credit System (CBCS)**

For

**Semester I & II (F.Y.B.Sc.)**

**BOTANY**

**SEMESTER – I**

**Paper No. B – 101: Plant Diversity**

**SEMESTER – II**

**Paper No. B – 201: Angiosperms, Tools and Techniques in Botany,  
Biochemistry and Genetics**

**INFORCE FROM JUNE – 2016**



## FOREWORD

Renewing and updating of the curriculum is an essential part of any vibrant university academic system. Revising the curriculum should be continues process to provide an updated education to the students at large. To meet the need and requirement of the society and in order to enhance the quality and standards of education, updating and restructuring of the curriculum must continue as a perpetual process. As a part of duty of study board, we the member of botany study board designed the new curriculum for First year (i.e. semester I & II) botany students. For designing of the curriculum we followed the UGC guideline for model curriculum. The exercise would not have been possible without the support of our respected faculties of botany. We hope that the results will fulfill expectations of the society.

**(Dr. R. D. Raviya)**

Other than Chairman  
Botany, Board of Studies  
Saurashtra University  
Rajkot

**(Dr. M. M. Jani)**

Chairman  
Botany, Board of Studies  
Saurashtra University  
Rajkot

**(Dr. Mehul Rupani)**

Other than Dean  
Faculty of Science  
Saurashtra University  
Rajkot

**(Dr. G. C. Bhimani)**

Dean  
Faculty of Science  
Saurashtra University  
Rajkot

# SAURASHTRA UNIVERSITY, RAJKOT

## Syllabus of Semester – I & II (F.Y. B.Sc.) Botany

Effective from June 2016

This curriculum consists of two theory papers and two practical. Syllabus has been divided in to two semesters (i.e. semester – I and II). Students have to study one paper in each semester and two practical based on theory papers. The course is to be completed by assigning six periods for each theory and six periods for each practical per week. Practical periods are inclusive of field study.

### GENERAL DETAILS OF TEACHING HOURS AND COURSE CREDIT

Paper no.	Title of the papers	Lectures	Theory Credit	Practical Credit	Total Credit
I	Plant Diversity	60	04	02	06
II	Angiosperms, Tools and Techniques in Botany, Biochemistry and Genetics	60	04	02	06

### Pattern of Examination:

Students will have to attend theory and practical both during the semester and at the end of semester, University exams will be conducted. Examination contains 70% external and 30% internal marks. A student's performance during every practical session is assessed and marks for a maximum of 15 is recorded. External practical evaluation will carry 35 marks, so total 50 marks for each practical per paper examination will be counted. Internal assessment for theory can be following any one as mention below.

Sr. No.	Pattern of Internal Exam	Marks
A	Assignments	10
	MCQ Written Test	10
	Seminar/ presentation	10
<b>OR</b>		
B	MCQ Written Test	30
<b>OR</b>		
C	Assignments	10
	MCQ Written Test	20
<b>OR</b>		
D	Seminar/ presentation	10
	MCQ Written Test	20

**Semester I & II (First Year B.Sc.)**

**SKELETON OF QUESTION PAPER FOR THEORY PAPERS**

**(EXTERNAL EXAMS)**

<b>Question 1 Based on UNIT 1</b>		
Q – 1 (A)	Objective type questions	4 Marks
Q – 1 (B)	Answer in brief (Any 1 out of 2)	2 Marks
Q – 1 (C)	Answer in detail (Any 1 out of 2)	3 Marks
Q – 1 (D)	Write a note on (Any 1 out of 2)	5 Marks
<b>Question 2 Based on UNIT 2</b>		
Q – 2 (A)	Objective type questions	4 Marks
Q – 2 (B)	Answer in brief (Any 1 out of 2)	2 Marks
Q – 2 (C)	Answer in detail (Any 1 out of 2)	3 Marks
Q – 2 (D)	Write a note on (Any 1 out of 2)	5 Marks
<b>Question 3 Based on UNIT 3</b>		
Q – 3 (A)	Objective type questions	4 Marks
Q – 3 (B)	Answer in brief (Any 1 out of 2)	2 Marks
Q – 3 (C)	Answer in detail (Any 1 out of 2)	3 Marks
Q – 3 (D)	Write a note on (Any 1 out of 2)	5 Marks
<b>Question 4 Based on UNIT 4</b>		
Q – 4 (A)	Objective type questions	4 Marks
Q – 4 (B)	Answer in brief (Any 1 out of 2)	2 Marks
Q – 4 (C)	Answer in detail (Any 1 out of 2)	3 Marks
Q – 4 (D)	Write a note on (Any 1 out of 2)	5 Marks
<b>Question 5 Based on UNIT 5</b>		
Q – 5 (A)	Objective type questions	4 Marks
Q – 5 (B)	Answer in brief (Any 1 out of 2)	2 Marks
Q – 5 (C)	Answer in detail (Any 1 out of 2)	3 Marks
Q 1 (D)	Write a note on (Any 1 out of 2)	5 Marks
<b>TOTAL MARKS : 70; TOTAL TIME : 2½ HOURS</b>		

### Total Scheme of evaluation

Semester	Theory			Practical		
	Internal	External	Total	Internal	External	Total
<b>I</b>	<b>30</b>	<b>70</b>	<b>100</b>	<b>15</b>	<b>35</b>	<b>50</b>
<b>II</b>	<b>30</b>	<b>70</b>	<b>100</b>	<b>15</b>	<b>35</b>	<b>50</b>

### Minimum requirements of plant material and Instruments for Botany Practical based on Paper B-101 and Paper B-201

- Use of one micro scope for two students in practical batch
- Fresh plant material as well preserve material as per syllabus
- Different types of stain for slide preparation
- Charts for life cycles
- Original plant / Photographs / charts for Medicinal plants.
- Different types of stain for slide preparation
- Paper chromatography chamber and their equipment's & Chemicals
- Twig of plant and charts for Families

## SAURASHTRA UNIVERSITY, RAJKOT

### Faculty of Science

### Course structure and Unique Code

### Syllabus of Semester – I & II (F.Y. B.Sc.) Botany

### Effective from June 2016

No	Course	Sem	Paper name	Paper No.	Credit	Unique Code No of Paper						
						Year	Faculty	Subject	Level	Sem	Paper NO.	Option
01	UG	I	<b>Plant Diversity</b>	B - 101	06	16	03	03	01	01	01	00
02	UG	II	<b>Angiosperms, Tools and Techniques in Botany, Biochemistry and Genetics</b>	B - 201	06	16	03	03	01	02	02	00



### List of Reference Books:

- 1) *Smith, G. M. (1955). Cryptogamic Botany Vol. I Algae and Fungi. Tata McGraw hill Publishing Company Ltd., New Delhi. 2<sup>nd</sup> edition.*
- 2) *Singh, V., Pande, P. C., Jain, D. K... (2014). A Text Book of Botany. Rastogi Publications, Meerut, New Delhi. 5<sup>th</sup> revised edition.*
- 3) *Singh, V., Pande, P. C., and Jain. D. K. (2015). A Text book of botany. Rastogi publications, Meerut, New Delhi. 4<sup>th</sup> edition.*
- 4) *Vashishta, B.R., Sinha, A.K. (2002). Botany for degree students. Fungi- S.Chand.*
- 5) *Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley and Sons (Asia), Singapore. 4<sup>th</sup> edition.*

### Unit – 3: Bryophyte

**0.8 Credit (12 Lectures)**

- 4.1 General account and outline of classification of bryophytes by Rothmaller up to class
- 4.2 Life history of *Riccia* (Excluding development)

### List of Reference Books:

- 1) *Smith, G. M. (1955). Cryptogamic Botany Vol. I Bryophytes and Pteridophytes. Tata McGraw hill Publishing Company Ltd., New Delhi. 2<sup>nd</sup> edition.*
- 2) *Singh, V., Pande, P. C., Jain, D. K... (2014). A Text Book of Botany. Rastogi Publication, Meerut, New Delhi. 5<sup>th</sup> revised edition.*
- 3) *Singh, V., Pande, P. C., and Jain. D. K. (2015). A Text book of botany. Rastogi publication, Meerut, New Delhi. 4<sup>th</sup> edition.*
- 4) *Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot, Allahabad.*

### Unit – 4: Pteridophyte

**0.8 Credit (12 Lectures)**

- 5.1 Origin, Evolution and Phylogeny of Land plants (General Account) with Geological time scale.
- 5.2 General accounts and outline of classification of Pteridophytes by G.M. Smith up to class
- 5.3 Life history of *Nephrolepis* (Excluding development)

**List of Reference Books:**

- 1) *Smith, G. M. (1955). Cryptogamic Botany Vol. I Bryophytes and Pteridophytes. Tata McGraw hill Publishing Company Ltd., New Delhi. 2<sup>nd</sup> edition.*
- 2) *Singh, V., Pande, P. C., Jain, D. K... (2014). A Text Book of Botany. Rastogi Publications, Meerut, New Delhi. 5<sup>th</sup> revised edition.*
- 3) *Singh, V., Pande, P. C., and Jain. D. K. (2015). A Text book of botany. Rastogi publications, Meerut, New Delhi. 4<sup>th</sup> edition.*
- 4) *Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India.*
- 5) *Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Pteridophyta. Central Book Depot, Allahabad.*

**Unit – 5: Gymnosperm****0.8 Credit (12 Lectures)**

- 6.1 General characters, outline of classification by GM Smith and characters of gymnosperms classes
- 6.2 Life history of *Cycus* (Excluding development)

**List of Reference Books:**

- 1) *Singh, V., Pande, P. C., Jain, D. K... (2014). A Text Book of Botany. Rastogi Publications, Meerut, New Delhi. 5<sup>th</sup> revised edition.*
- 2) *Singh, V., Pande, P. C., and Jain. D. K. (2015). A Text book of Botany. Rastogi publications, meerut, New Delhi. 4<sup>th</sup> edition.*



### **Practical based on Paper B-101**

- 1) Study of morphology, anatomy and reproductive structures in *Spirogyra* algae
- 2) Study of morphology, anatomy and reproductive structures in *Sargassum* algae
- 3) Study of morphology, anatomy and reproductive structures in Fungi : *Mucor*
- 4) Study of morphology, anatomy and reproductive structures in Fungi : *Agaricus*
- 5) Study of morphology, anatomy and reproductive structures in *Riccia*
- 6) Study of morphology, anatomy and reproductive structures in *Nephrolepis*
- 7) Study of morphology, anatomy and reproductive structures in *Cycus*
- 8) To study the Medicinal plants: *Vitex negundo*; *Cassia fistula*; *Terminalia belerica*; *Emblica officinalis*; *Pongamia pinnata*
- 9) Field study / Study Tour

### **List of Reference Books:**

- 1) *Bendre, A. M. and Ashok Kumar, (2009) A Text book of Practical Botany Vol. I & II. Rastogi Publications, Meerut. 9<sup>th</sup> edition.*

## Semester II

### **Paper – B-201: Angiosperms, Tools and Techniques in Botany, Biochemistry and Genetics**

#### **Unit – 1: Vegetative Morphology                      0.6 Credit                      (11 Lectures)**

- 1.1 Habit, Habitat, Root and Stem (Excluding modification)
- 1.2 Leaf : Parts of leaf; phyllotaxis; types of leaves; venation.; stipules; leaf shapes; leaf margin; leaf base; leaf apex; venation.

#### **Unit – 2: Reproductive Morphology                      0.8 Credit                      (14 Lectures)**

- 2.1 Inflorescences: Racemose and Cymose and special types –*Cyathium, Verticillaste, Hypanthodium*
- 2.2 Typical Flowers
  - 2.2.1 Definition; bract; pedicel; symmetry; sexuality; hypogynous; epigynous; perigynous.
  - 2.2.2 Calyx: function and types.
  - 2.2.3 Corolla: function forms and aestivation.
  - 2.2.4 Perianth
  - 2.2.5 Androecium: Parts of a Stamen, Attachment
  - 2.2.6 Gynoecium: Parts of carpels; function; placentation, Structure of stigma style and ovary  
Types of fruit
  - 2.2.7 Floral formula and Floral diagram

#### **Unit – 3: Systematic Botany                                      0.5 Credit                                      (10 Lectures)**

- 3.1 Systems of classification – Bentham & Hooker with merits and demerits
- 3.2 Taxonomic studies of plants from each following angiosperm's families
  - 3.2.1 Malvaceae
  - 3.2.2 Apocynaceae
  - 3.2.3 Nyctaginaceae
  - 3.2.4 Poaceae

#### **List of Reference Books for Unit 1, 2 and 3**

- 1) *Sundara Rajan, S., (1996). Introductory Taxonomy of Angiosperms. Himalaya Publishing House, Bombay/Delhi/Nagpur. 1<sup>st</sup> edition.*
- 2) *Datta, S. C. (1988). Systematic botany. Wiley eastern limited- New Delhi. 4<sup>th</sup> edition.*

- 3) Pandey, B.P. (1999). *Taxonomy of Angiosperms. For university student. S. Chand and Com. Ltd, New Delhi 1<sup>st</sup> edition reprints.*
- 4) Kumavesan Annie. (2010.) *Taxonomy of Angiosprems. Saras publication, Nagercoil, Tamilnadu. 3<sup>rd</sup> edition.*
- 5) Sutariya, R. N. (1958). *A text book of Systematic Botany. Khadayata Book Depot, Ahmedabad. 2<sup>nd</sup> edition.*
- 6) Singh, V. and Jain, D. K. (1996). *Taxonomy of Angiosperms. Rastogi Publications, Meerut, India. 2<sup>nd</sup> edition.*

#### **Unit – 4: Tools and Techniques in Botany                      0.5 Credit    (09 Lectures)**

- 4.1 Principles and mechanisms of light and electron microscope
- 4.2 Principle and applications of paper chromatography techniques
- 4.3 Tissue culture (Basics, Media preparations, Applications, Brief introduction)
- 4.4 Principle and function of pH meter
- 4.5 Principles and function of colorimeter

##### **List of Reference Books:**

- 1) Rana, S. V. S. (2009). *Biotechniques Theory & Practice. Rastogi Publications, Meerut. 2<sup>nd</sup> edition.*

#### **Unit – 5: Biochemistry and Genetics                              1.6 Credit    (16 Lectures)**

- 5.1 Characters and classification (Reaction base and polarity base) of amino acids
- 5.2  $\beta$  – Oxidation
- 5.3 Classification and action mechanisms of enzymes
- 5.5 Principles of Mendelian genetics
- 5.5 Structure of DNA
- 5.6 DNA replication
- 5.7 Protein synthesis

##### **List of Reference Books:**

- 1) Gupta, P. K. (2007). *Genetics, cytology and evolution .Rastogi Publications, Meerut, New Delhi. 1<sup>st</sup> edition.*
- 2) Gupta, P.K. (2007). *Genetics-classical to modern Rastogi Publication-Meerut. 1<sup>st</sup> edition.*

- 3) Gupta, P.K. (2007). *Genetics Rastogi Publication-Meerut. 3<sup>rd</sup> edition.*
- 4) Arumugam, N., Meyyan, R.P., Kumarsen, V., Sundaralingam, R. (2014) *Genetics, Biometrics and Bioinformatics. Saras publication, Nagercoil, Tamilnadu. 1<sup>st</sup> edition.*
- 5) Anne. Regaed. , Kumaresan, V., Arumugam, N. (2014) *Algae. Saras publication, Kattar P.O. Nagercoil, Tamilnadu. 1<sup>st</sup> edition.*
- 6) Gupta, P.K. (2010). *Cell and molecular biology. Rastogi publications - Meerut 3<sup>rd</sup> edition.*
- 7) Kochae, P. L. (1970). *Genetics and Evolution. S. Nagin & Co., Delhi. 6<sup>th</sup> edition.*

### **Practical based on Paper B-201**

- 1) Morphological studies of different plants parts – leaf
- 2) Morphological studies of different plants parts – Inflorescences
- 3) Morphological studies of different plants parts – Flowers (Calyx, Corolla, Perianth, Androecium, and Gynoecium).
- 4) Morphological studies of different plants parts – Fruits
- 5) Taxonomic study of Malvaceae family with its economical and medicinal values.
- 6) Taxonomic study of Apocynaceae family with its economical and medicinal values.
- 7) Taxonomic study of Nyctaginace family with its economical and medicinal values.
- 8) Enzyme activity of catalase, invertase, amylase
- 9) Study of plastids to examine pigment distribution in plants (e.g. *Cassia, Lycopersicon, Capsicum*).
- 10) To extract and separate chloroplast pigments by paper chromatographic technique
- 11) Visit of the research laboratories / Universities / Forest etc according to conveniences of colleges.

### **List of Reference Books:**

- 1) Bendre, A. M. and Ashok Kumar, (2009) *A Text book of Practical Botany Vol. I & II. Rastogi Publications, Meerut. 9<sup>th</sup> edition.*

# Saurashtra University, Rajkot

Semester – I CBCS Subject: - Botany

Practical Examination

Practical Skeleton Based on Paper – B-101

Time: - 3 hours

Total Marks: - 35

Q – 1 Identify and classify the given specimen “A” and “B” with reasons----- (06)

	X		Y
A		A	
B		B	

Q – 2 Identify and describe the specimen “C” and “D” with diagrams ----- (06)

	X		Y
C		C	
D		D	

Q – 3 Identify and describe the specimen “E” and “F” ----- (06)

	X		Y
E		E	
F		F	

Q – 4 Identify and describe the specimen “G” ----- (04)

	X		Y
G		G	

Q – 5 Rotation H, I, J, K ----- (08)

H –		I –	
J –		K –	

Q - 6 Journal ----- (05)

# Saurashtra University, Rajkot

Semester – II CBCS Subject: - Botany

## Practical Examination

### Practical Skeleton Based on Paper – B-201

Time: - 3 hours

Total Marks: - 35

Q – 1 Identify and classify the given families “A” and “B” by giving proper reasons, floral Diagram and floral formula ----- (06)

	X	Y
A		A
B		B

Q – 2 Identify and describe the specimen “C” and “D” (Morphology base) ----- (06)

	X	Y
C		C
D		D

Q – 3 Submission of study report of the field visit ----- (04)

Q – 4 Perform the enzyme activity of given enzyme sample ----- (08)

OR

Separation of plant extract by paper chromatography ----- (08)

Q – 5 Rotation E, F, G ----- (06)

Q – 6 Journal ----- (05)