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)	**(Dr. M. M. Jani)**	**(Dr. Mehul Rupani)**	**(Dr. G. C. Bhimani)**
Other than Chairman	**Chairman**	**Other than Dean**	**Dean**
Botany, Board of Studies	**Botany, Board of Studies**	**Faculty of Science**	**Faculty of Science**
Saurashtra University	**Saurashtra University**	**Saurashtra University**	**Saurashtra University**
Rajkot	**Rajkot**	**Rajkot**	**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
OR		
B	MCQ Written Test	30
OR		
C	Assignments	10
	MCQ Written Test	20
OR		
D	Seminar/ presentation	10
	MCQ Written Test	20

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

SKELETON OF QUESTION PAPER FOR THEORY PAPERS

(EXTERNAL EXAMS)

Question 1 Based on UNIT 1		
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
Question 2 Based on UNIT 2		
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
Question 3 Based on UNIT 3		
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
Question 4 Based on UNIT 4		
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
Question 5 Based on UNIT 5		
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
TOTAL MARKS : **70;** TOTAL TIME : **2½** HOURS		

Total Scheme of evaluation

Semester	Theory			Practical		
	Internal	External	Total	Internal	External	Total
I	30	70	100	15	35	50
II	30	70	100	15	35	50

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	**Plant Diversity**	B - 101	06	16	03	03	01	01	01	00
02	UG	II	**Angiosperms, Tools and Techniques in Botany, Biochemistry and Genetics**	B - 201	06	16	03	03	01	02	02	00

Semester - I

Paper – B-101: Plant Diversity

Unit-1: Introductory Botany and Algae 0.8 Credit (12 Lectures)

1.1 Scope and objectives of Botany

1.2 Branches of Botany

1.3 Classification: Whittaker (Five Kingdom)

1.4 General characters, Smith's classification and Algae in human welfare.

1.5 Life history of *Spirogyra* (Chlorophyceae), *Sargassum* (Phaeophyceae) (Excluding development)

List of Reference Books:

1) *Smith, G. M. (1955). Cryptogamic Botany Vol. I Algae and Fungi. Tata McGraw hill Publishing Company Ltd., New Delhi. 2nd edition.*
2) *Singh, V., Pande, P. C., Jain, D. K.. (2014). A Text Book of Botany. Rastogi Publications, Meerut, New Delhi. 5th revised edition.*
3) *Singh, V., Pande, P. C., and Jain. D. K. (2015). A Text book of botany. Rastogi publications, Meerut, New Delhi. 4th edition.*
4) *Vashishta, B.R. (1987). Botany for degree students - Algae. S. Chand and company (Pvt.) Ltd Ram Nagar-New Delhi. 7th edition.*
5) *Anne. Regaed. , Kumaresan, V., Arumugam, N. (2014) Algae. Saras publication, Kattar P.O. Nagercoil, Tamilnadu. 1st edition.*
6) Gangulee, H. C., Das, K. S., Dutta, C. (2005). College Botany Volume – 1. New Central Book Agency, India 1st edition.

Unit –2: Fungi 0.8 Credit (12 Lectures)

3.1 General characters, Alexopolus' classification and fungi in human welfare.

3.2 Life history of *Mucor* (Zygomycotina), *Agaricus* (Bacidiomycotina) (Excluding development)

List of Reference Books:

1) *Smith, G. M. (1955). Cryptogamic Botany Vol. I Algae and Fungi. Tata McGraw hill Publishing Company Ltd., New Delhi. 2nd edition.*

2) *Singh, V., Pande, P. C., Jain, D. K... (2014). A Text Book of Botany. Rastogi Publications, Meerut, New Delhi. 5th revised edition.*

3) *Singh, V., Pande, P. C., and Jain. D. K. (2015). A Text book of botany. Rastogi publications, Meerut, New Delhi. 4th 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. 4th 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. 2nd edition.*

2) *Singh, V., Pande, P. C., Jain, D. K... (2014). A Text Book of Botany. Rastogi Publication, Meerut, New Delhi. 5th revised edition.*

3) *Singh, V., Pande, P. C., and Jain. D. K. (2015). A Text book of botany. Rastogi publication, Meerut, New Delhi. 4th 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. 2nd edition.*

2) *Singh, V., Pande, P. C., Jain, D. K... (2014). A Text Book of Botany. Rastogi Publications, Meerut, New Delhi. 5th revised edition.*

3) *Singh, V., Pande, P. C., and Jain. D. K. (2015). A Text book of botany. Rastogi publications, Meerut, New Delhi. 4th 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. 5th revised edition.*

2) *Singh, V., Pande, P. C., and Jain. D. K. (2015). A Text book of Botany. Rastogi publications, meerut, New Delhi. 4th 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. 9th 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. 1st edition.*
2) *Datta, S. C. (1988). Systematic botany. Wiley eastern limited- New Delhi.4th edition.*

3) *Pandey, B.P. (1999). Taxonomy of Angiosperms. For university student. S. Chand and Com. Ltd, New Delhi 1st edition reprints.*

4) *Kumavesan Annie. (2010.) Taxonomy of Angiosprems. Saras publication, Nagercoil, Tamilnadu. 3rd edition.*

5) *Sutariya, R. N. (1958). A text book of Systematic Botany. Khadayata Book Depot, Ahmedabad. 2nd edition.*

6) *Singh, V. and Jain, D. K. (1996). Taxonomy of Angiosperms. Rastogi Publications, Meerut, India. 2nd 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. 2nd 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 β – 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. 1st edition.*

2) *Gupta, P.K. (2007). Genetics-classical to modern Rastogi Publication-Meerut. 1st edition.*

3) *Gupta, P.K. (2007). Genetics Rastogi Publication-Meerut. 3rd edition.*

4) *Arumugam, N., Meyyan, R.P., Kumarsen, V., Sundaralingam, R. (2014) Genetics, Biometrics and Bioinformatics. Saras publication, Nagercoil, Tamilnadu. 1st edition.*

5) *Anne. Regaed. , Kumaresan, V., Arumugam, N. (2014) Algae. Saras publication, Kattar P.O. Nagercoil, Tamilnadu. 1st edition.*

6) *Gupta, P.K. (2010). Cell and molecular biology. Rastogi publications - Meerut 3rd edition.*

7) *Kochae, P. L. (1970). Genetics and Evolution. S. Nagin & Co., Delhi. 6th 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, Androcium, 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*, *Lycopercicon*, *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. 9th 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)

Re-Accredited

Grade A by NAAC

SAURASHTRA UNIVERSITY

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

For

Semester III & IV (S.Y.B.Sc.)

BOTANY

SEMESTER – III

Paper No. B – 301: Plant Diversity – 2

SEMESTER – IV

Paper No. B – 401: Study of Plants with reference to Anatomy, Embryology, Physiology, Ecology and Application.

INFORCE FROM JUNE – 2017

Re-Accredited

Grade A by NAAC

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 Second year (i.e. semester III & IV) 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)	***(Dr. M. M. Jani)***	***(Dr. Mehul Rupani)***	***(Dr. G. C. Bhimani)***
Other than Chairman	***Chairman***	***Other than Dean***	***Dean***
Botany, Board of Studies	***Botany, Board of Studies***	***Faculty of Science***	***Faculty of Science***
Saurashtra University	***Saurashtra University***	***Saurashtra University***	***Saurashtra University***
Rajkot	***Rajkot***	***Rajkot***	***Rajkot***

SAURASHTRA UNIVERSITY, RAJKOT

Syllabus of Semester – III & IV (S.Y. B.Sc.) Botany

Effective from June 2017

This curriculum consists of two theory papers and two practical. Syllabus has been divided in to two semesters (i.e. semester – III and IV). 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***
B – 301	***Plant Diversity – 2***	***60***	***04***	***02***	***06***
B – 401	***Study of Plants with reference to Anatomy, Embryology, Physiology, Ecology and Application.***	***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*
OR		
B	*MCQ Written Test*	*30*
OR		
C	*Assignments*	*10*
	MCQ Written Test	*20*
OR		
D	*Seminar/ presentation*	*10*
	MCQ Written Test	*20*

Semester III & IV (Second Year B.Sc.)

SKELETON OF QUESTION PAPER FOR THEORY PAPERS (EXTERNAL EXAMS)

QUESTION 1 – UNIT 1		
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*
QUESTION 2 – UNIT 2		
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*
QUESTION 3– UNIT 3		
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*
QUESTION 4 – UNIT 4		
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*
QUESTION 5 – UNIT 5		
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*
TOTAL MARKS : 70 TOTAL TIME : 2½ HOURS		

Total Scheme of evaluation

Semester	***Theory***			***Practical***		
	Internal	***External***	***Total***	***Internal***	***External***	***Total***
I	***30***	***70***	***100***	***15***	***35***	***50***
II	***30***	***70***	***100***	***15***	***35***	***50***

Minimum requirements of plant material and Instruments for Botany Practical based on Paper B - 301 and Paper B - 401

- 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 – III & IV (S.Y. B.Sc.) Botany

Effective from June 2017

No	*Course*	*Sem.*	*Paper name*	*Paper No.*	*Credit*	*Unique Code No of Paper*						
						Year	*Faculty*	*Subject*	*Level*	*Sem*	*Paper NO.*	*Option*
01	*UG*	*III*	***Plant Diversity – 2***	*B-301*	*06*	*17*	*03*	*03*	*01*	*03*	*01*	*00*
02	*UG*	*IV*	***Study of Plants with reference to Anatomy, Embryology, Physiology, Ecology and Application.***	*B-401*	*06*	*17*	*03*	*03*	*01*	*04*	*02*	*00*

New Theory Syllabus (CBCS) for Semester - III

In forced from June – 2017

BOTANY PAPER – 301

(PLANT DIVERSITY – 2)

UNIT – I : ALGAE

I.1 Ultra structure of Eukaryotic algal cell.

I.2 Ranges of Thallus Structure.

I.3 Life history of the following genus (Excluding development)

(a) *Nostoc* (b) *Batrachospermum*

I.4 Algae causing biological disturbances.

UNIT – II : FUNGI

II.1 Ultra structure of fungal cell.

II.2 Life history of the following genus (Excluding development)

(Classification according to Ainsworth)

(a) *Aspergillus* (b) *Saccharomyces*

II.3 Industrial applications of above mention species.

UNIT – III : BRYOPHYTA

III.1 Vegetative reproduction in Bryophytes.

III.2 Life history of the following genus (Excluding development)

(a) *Marchantia* (b) *Funaria*

III.3 Economic importance of Bryophytes.

UNIT – IV : PTERIDOPHYTA

IV.1 Life history of the following genus (Excluding development)

(a) *Sellaginella* *(b)* *Adiantum*

IV.2 Heterospory and seed habitat.

IV.3 Types of stele and stellar evolution.

IV.4 Telome Theory.

UNIT – V: GYMNOSPERM AND ANGIOSPERMS

V.1 Embryogeny and life history of *Pinus.*

V.2 Study of following plants families with 2 – 3 plants belonging to the families with reference to classification system of Bentham & Hooker's

(A) Dicotyledons

(1) Fabaceae (2) Apiaceae

(3) Combretaceae (4) Euphorbiaceae

(5) Verbenaceae (6) Acanthaceae

(B) Monocotyledons

(1) Commelinaceae (2) Amaryllidaceae

Semester – 3 (S.Y.B.Sc.) – BOTANY

PRACTICAL: P - 301

(Based on paper – 301-P)

1. Study of algal genera with reference to the types mentioned in theory
2. Study of fungal genera with reference to the types mentioned in theory
3. Study of Bryophytes genera with reference to the types mentioned in theory
4. Study of Pteridophytes genera with reference to the types mentioned in theory
5. Study of Gymnosperms genera with reference to the types mentioned in theory
6. Families are to be studied with the help of available plants as per theory.
   - ❖ A twig of plant with flower / inflorescences
   - ❖ Whole flower (various plants)
   - ❖ L.S. of flower
   - ❖ T.S. of flower
   - ❖ Floral formula
   - ❖ Floral diagram
   - ❖ Botanical names
7. Study of various steles by section cutting.

New Theory Syllabus (CBCS) for Semester - IV
In forced from June – 2017
BOTANY PAPER – 401
(Study of Plants with reference to Anatomy, Embryology, Physiology, Ecology and Application)

UNIT – I PLANT ANATOMY

I.1 Anatomical studies of monocot and Dicot plants (Root, stem and leaf)

I.2 Secondary growth in monocotyledons and dicotyledonos (Stem)

I.3 Anomalous secondary growth in ***Bignonia*** and ***Dracaen.***

UNIT – II PLANT EMBRYOLOGY

II.1 Megasporogenesis

II.2 Types of embryo sac

II.3 Development of malegametophytes

II.4 Double Fertilization.

UNIT – III PLANT PHYSIOLOGY

III.1 Absorption of minerals

III.2 Translocation of organic solutes.

III.3 Diffusion, Imbibitions and Osmosis.

III.4 Vernalization.

III.5 Physiology of Seed dormancy.

UNIT – IV ECOLOGY

IV.1 Edaphic factors – Soil: Composition, Origin & development, Soil profile

IV.2 Soil erosion

IV.3 Soil conservation

IV.4 Remote sensing as a tool for vegetational analysis.

UNIT – V APPLIED BOTANY

V.1 Artificial Seeds.

V.2 Herbarium - Tool and technique

V.3 Polyploidy in plants

V.4 Pure line and mass selection

V.5 Maternal Influence on inheritance

V.5.1 Cytoplasmic inheritance in Yeast

V.5.2 Cytoplasmic inheritance in *Mirabilis jalapa*

Semester -4 (S.Y.B.Sc.) – BOTANY

PRACTICAL: P – 401

(Based on paper – 401-P)

1. Study of different simple tissue systems of plants through section cutting.
2. To study of xylem component by maceration technique.
3. Anatomical studies of Secondary growth in Stem.
4. Study of anomalous secondary growth in ***Bignonia*** and ***Dracaena***.
5. Germination of pollen grain
6. Mounting of embryo (Dicot/Monocot).
7. To study L.S. of Maize grain.
8. Imbibitions experiment.
9. Thistle funnel experiment for Osmosis.
10. Conduction of water through Xylem.
11. To demonstrate water holding capacity.
12. Test for the presence of carbonate, nitrate and pH of the soil.
13. Study tour – Farm / Research laboratory / Institutes / University for current trends in applied botany

A list of reference books

1.	A text book of Algae	A.V.S.S.Sambamurty
2.	Algae	B.R.Vashishta
3.	Algae	G.L.Chopra
4.	The fungi	B.P.Pandey
5.	Introduction to fungi	Dayal & Raizada
6.	Bryophytes	B.R.Vashishta
7.	Cryptogamic Botany Vol. – I & Vol. – II	G.M.Smith
8.	Pteridophyta : New look	O.P.Sharma
9.	Pteridophytes	P.C.Vashishta
10.	Gymnosperms	O.P.Sharma
11.	A textbook of Systematic Botany	R.N.Sutaria
12.	An introduction to taxonomy of angiosperms	Shukla P. & S.P.Sharma
13.	Taxonomy of angiosperms	B.P.Pandey
14.	Taxonomy of angiosperms	V.H.Naik
15.	The Embryology of Angiosperms	Bhojwani & Bhatnagar
16.	A text book of Botany	Singh, Pande & Jain
17.	A textbook of ecology	Vashistha & Gill
18.	A textbook of Practical Botany Vol.–I & Vol.–II	Bendra & Kumar
19.	Anatomy and embryology	Singh, Pandey & Jain
20.	College Botany Vol. – I & Vol. – II	B.P.Pandey
21.	Ecology and Environment	P.D.Sharma
22.	Ecology and Soil Science	Shukla & Sharma
23.	Ecology and sustainable development	S.Ramkrishnan
24.	Embryology	P.Maheshwary
25.	Fundamentals of Ecology	E.P.Odum
26.	Plant Anatomy	B.P.Pandey
27.	Plant Anatomy	P.J.Chandurkar
28.	Plant Physiology	P.L.Kocchar
29.	Plant Physiology	Pandey & Sinha
30.	Plant Physiology	Salisbury & Ross
31.	Plant Physiology	V.K.Jain
32.	Plant Physiology	V.Verma

Re-Accredited
Grade A by NAAC

SAURASHTRA UNIVERSITY

Syllabus on the bases of Choice Based Credit System (CBCS)
For
Semester V & VI (T.Y. B.Sc.)

SUBJECT- BOTANY

Semester – V		**Semester – VI**	
Paper No.	**Title of the papers**	**Paper No.**	**Title of the papers**
B-501	Cryptogamic Botany and Plant Pathology	**B-601**	Genetics, Molecular Biology, Biotechnology, Horticulture, Plant Breeding and Anatomy
B-502	Biology of Seed Plants	**B-602**	Plant Physiology, Biochemistry, Biostatistics, Microbiology and Biodiversity
B-503	Ecology	**B-603**	Instrumentation, Advance Techniques in Biology, Forest – Forestry, Medicinal Plants and Economic Botany
PROJECT	**Project Work should be done during whole year – 100 Mark**		

INFORCE FROM JUNE - 2018

Re-Accredited
Grade A by NAAC

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 third year (i.e. semester V& VI) 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.

Other than Chairman	***Chairman***	***Other than Dean***	***Dean***
Botany, Board of Studies	***Botany, Board of Studies***	***Faculty of Science***	***Faculty of Science***
Saurashtra University	***Saurashtra University***	***Saurashtra University***	***Saurashtra University***
Rajkot	***Rajkot***	***Rajkot***	***Rajkot***

SAURASHTRA UNIVERSITY, RAJKOT

Syllabus of Semester – V& VI (T.Y. B.Sc.) Botany

Effective from June 2018

This curriculum consists of six theory papers and six practical. Syllabus has been divided in to two semesters (i.e. semester – V and VI). Students have to study three paper in each semester and three 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 COURSE CREDIT

Paper no.	***Title of the papers***	***Theory Credit***	***Practical Credit***	***Total Credit***
B-501	Cryptogamic Botany and Plant Pathology	***04***	***02***	***06***
B-502	Biology of Seed Plants	***04***	***02***	***06***
B-503	Ecology	***04***	***02***	***06***
B-601	Genetics, Molecular Biology, Biotechnology, Horticulture, Plant Breeding and Anatomy	***04***	***02***	***06***
B-602	Plant Physiology, Biochemistry, Biostatistics, Microbiology and Biodiversity	***04***	***02***	***06***
B-603	Instrumentation, Advance Techniques in Biology, Forest – Forestry, Medicinal Plants and Economic Botany	***04***	***02***	***06***
PROJECT	**Project Work (work should be done during whole year)**			

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
OR		

B	MCQ Written Test	30
OR		
C	Assignments	10
	MCQ Written Test	20
OR		
D	Seminar/ presentation	10
	MCQ Written Test	20

Semester V& VI (Third Year B.Sc.)
SKELETON OF QUESTION PAPER FOR THEORY PAPERS
(EXTERNAL EXAMS)

QUESTION 1 – UNIT 1		
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*
QUESTION 2 – UNIT 2		
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*
QUESTION 3– UNIT 3		
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*
QUESTION 4 – UNIT 4		
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*
QUESTION 5 – UNIT 5		
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*
TOTAL MARKS : 70 TOTAL TIME : 2½ HOURS		

Total Scheme of evaluation

Semester no.	***Theory mark***			***Practical mark***		
	Internal	***External***	***Total***	***Internal***	***External***	***Total***
V	***30***	***70***	***100***	***15***	***35***	***50***
VI	***30***	***70***	***100***	***15***	***35***	***50***

Course structure and Unique Code
Syllabus of Semester – V & VI (T.Y. B.Sc.) Botany
Effective from June 2018

No	*Course*	*Sem.*	*Paper name*	*Paper No.*	*Credit*	*Unique Code No of Paper*					
						Year	*Faculty*	*Subject*	*Level*	*Sem*	*Option*
01	*UG*	*V*	Cryptogamic Botany and Plant Pathology	*B-501*	*06*	*2018*	*03*	*001509*	*01*	*05*	*00*
02	*UG*	*V*	Biology of Seed Plants	*B-502*	*06*	*2018*	*03*	*001510*	*01*	*05*	*00*
03	*UG*	*V*	Ecology	*B-503*	*06*	*2018*	*03*	*001511*	*01*	*05*	*00*
04	*UG*	*VI*	Genetics, Molecular Biology, Biotechnology, Horticulture, Plant Breeding and Anatomy	*B-601*	*06*	*2018*	*03*	*001611*	*01*	*06*	*00*
05	*UG*	*VI*	Plant Physiology, Biochemistry, Biostatistics, Microbiology and Biodiversity	*B-602*	*06*	*2018*	*03*	*001612*	*01*	*06*	*00*
06	*UG*	*VI*	Instrumentation, Advance Techniques in Biology, Forest – Forestery, Medicinal Plants and Economic Botany	*B-603*	*06*	*2018*	*03*	*001613*	*01*	*06*	*00*

GENERAL DETAILS OF THEORY PAPERS

SEMESTER -V	
Paper no.	**Title of the papers**
B-501	Cryptogamic Botany and Plant Pathology
B-502	Biology of Seed Plants
B-503	Ecology
SEMESTER -VI	
B-601	Genetics, Molecular Biology, Biotechnology, Horticulture, Plant Breeding and Anatomy
B-602	Plant Physiology, Biochemistry, Biostatistics, Microbiology and Biodiversity
B-603	Instrumentation, Advance Techniques in Biology, Forest – Forestry, Medicinal Plants and Economic Botany

Practicals

SEMESTER – V			
Practical	**Title of the practicals**	**Duration**	**Marks**
I	Cryptogamic Botany and Plant Pathology	3 Hours	35
II	Biology of Seed Plants	3 Hours	35
III	Ecology	3 Hours	35
SEMESTER – VI			
IV	Genetics, Molecular Biology, Biotechnology, Horticulture, Plant Breeding and Anatomy	3 Hours	35
V	Plant Physiology, Biochemistry, Biostatistics, Microbiology and Biodiversity	3 Hours	35
VI	Instrumentation, Advance Techniques in Biology, Forest – Forestry, Medicinal Plants and Economic Botany	3 Hours	35
PROJECT	**Project Work (work should be done during whole year)**	3 Hours	**100**

Project work

Science is the field of experimental research and comprehensible reading. In order to fulfill these requirements our university has introduced the project work. So that students can have habit for reading research articles and able to understand the possible causes of current problems or can visualize the diverse nature of ecosystems and its organisms. Project work contains 100 marks. Project report should be submitted at the end of sixth semester and its viva voce can be arranged during practical exams of sixth semester.

Submission work

1. Permanent slides (minimum 6)
   Giant Chromosomes - 1, Mitosis -1, Meiosis-1, Double Stain- 2, Embryo- 1
2. Herbarium Sheets (minimum 10)
3. Rolling chart / project with academic value
4. During the academic year compulsorily arrange one study tour of rich biodiversity region of the country outside the state and students have to submit tour report.
5. The students should visit to one of the following institution for study purpose
   - Agriculture University – Junagadh
   - National Research Center for Ground nut (NRCG) – Junagadh
   - Aurvedic College
   - Pharmaceutical college or Institute
   - Field visit : Forest area / Rich biodiversity area / garden / dam site area
6. Students should start preparation of the submission work from V^{th}–Semester. Submission work must be presented on third day of practical exam of semester – VI^{th} .

Semester – V
New theory Syllabus
BOTANY PAPER: B-501
(CRYPTOGAMIC BOTANY AND PLANT PATHOLOGY)

UNIT: - I ALGAE [14 marks]

I.1 Life history of following genus (Excluding development)
I.1.1*Coleochetae* I.1.2 *Caulerpa*
I.1.3 *Chara* I.1.4 *Ectocarpus*
I.2 Evolution of sex in algae

UNIT: - II FUNGI [14 marks]

II.1 Life history of following genus (Excluding development)
II.1.1 *Peziza* II.1.2 *Alternaria*
II.2 Different types of spores in fungi

UNIT: - III BRYOPHYTES [14 marks]

III.1 Life history of following genus (Excluding development)
III.1.1 *Pellia* III.1.2 *Sphagnum*

UNIT: - IV PTERIDOPHYTES [14 marks]

IV.1 Life history of following genus (Excluding development)
IV.1.1 *Ophioglossum* IV.1.2 *Marsilea*
IV.2 Morphology and anatomy of *Rhynia, Lepidodendron*
IV.3 Morphology and anatomy of *Calamites*

UNIT: - V PLANT PATHOLOGY [14 marks]

V.1 General Symptoms of diseases
V.2 Study of different diseases of plants
V.2.1 Tikka disease of ground nut
V.2.2 Red rot of sugarcane
V.2.3 Whip smut of sugarcane
V.2.4 Citrus canker
V.2.5 Leaf curl of papaya
V.3 Plant disease control

Semester – V
New theory Syllabus
BOTANY PAPER: B-502
(BIOLOGY OF SEED PLANTS)

UNIT: - I **GYMNOSPERMS** **[14 marks]**

I.1 Life history of following genus (Excluding development)

I.1.1 *Ephedra* I.1.2 *Gnetum*

I.2 Morphology and anatomy of *Lyginodendron*, *Cycadeoidea*

I.3 Morphology and anatomy of *Cordites*, *Pentoxylon*

UNIT:-II **ANGIOSPERMS** **[14marks]**

II.1 Concept of taxon and taxonomic hierarchy

II.1.1 Taxonomic categories

II.1.2 Concept of genus and species

II.1.3 Concept of families

II.2 Principles of taxonomy

II.3 Classification systems of Bentham and Hooker

UNIT: III **TAXONOMIC STUDIES OF FOLLOWING FAMILIES**
(According to Bentham and Hooker System) **[28 marks]**

III.1 Detailed studies of family of Polypetalae

III.1.1 Capparidaceae III.1.2 Tiliaceae

III.1.3 Lythraceae III.1.4 Rosaceae

III.2 Detailed studies of family of Gamopetalae

III.2.1 Asteraceae III.2.2 Asclepidaceae

III.2.3 Convolulaceae III.2.4 Solanaceae

III.2.5 Bignoneaceae

III.3 Detailed studies of family of Monochlamydeae

III.3.1 Amaranthaceae III.3.2 Polygonaceae

III.4 Detailed studies of family of Monocotyledon

III.4.1 Canaceae III.4.2 Cypraceae

UNIT:- IV **EMBRYOLOGY** **[14 marks]**

IV.1 Types and function of endosperm

IV.2 Embryo development in monocotyledons (sagittaria type)

IV.3 Embryo development in dicotyledons (crucifer type)

IV.4 Characters of pollen grain and factors affecting pollen germination.

Semester – V
New theory Syllabus
BOTANY PAPER: B-503
(ECOLOGY)

UNIT: - I INTRODUCTION TO ECOLOGY [14 marks]

I.1 Structure of ecosystem
I.2 Types of ecosystems
I.3 Energy flow in ecosystem system
I.4 Productivity of ecosystem

UNIT: - II COMMUNITIES STRUCTURE AND CLASSIFICATION [14 marks]

II.1 Characters of community
II.2 Characters used in community structures
II.3 Methods of ecological studies

UNIT: - III ECOLOGICAL SUCCESSION, POPULATOION [14 marks]

III.1 Plant succession: Causes, trends, types, process, examples of succession
III.2 Population characteristics
III.3 Ecological pyramids

UNIT: - IV AUTECHOLOGY [14 marks]

IV.1 Biological clocks
IV.2 Liebig's law of the minimum; Shelford's law of tolerance
IV.3 Principle of limiting factors and ecological factors
IV.4 Ecological concept of species and individuals

UNIT: - V ECOLOGICAL MANAGEMENTS [14 marks]

V.1 Environmental education and organization
V.2 Environmental laws
V.3 GPS

Semester – VI
New theory Syllabus
BOTANY PAPER: B-601
(GENETICS, MOLECULAR BIOLOGY, BIOTECHNOLOGY, HORTICULTURE, PLANT BREEDING AND ANATOMY)

UNIT: - I GENETICS [14 marks]

I.1 Linkage (coupling and repulsion hypothesis)
I.2 Crossing over (chromosome mapping)
I.3 Structure of RNA
I.4 Gene mutations (somatic/germ line and spontaneous / induced)

UNIT: - II MOLECULAR BIOLOGY [14 marks]

II.1 Restriction endonucleases
II.2 Cloning vectors
II.3 Techniques used in recombinant DNA technology.
II.4 Gene expression in prokaryotes (Lac operon concept)

UNIT: - III BIOTECHNOLOGY [14 marks]

III.1 Transgenic plants
III.2 Tissue culture: media preparation technique and application
III.3 Cryopreservation and germplasm storage

UNIT: - IV HORTICULTURE AND PLANT BREEDING [14 marks]

IV.1 Aims, objective and impacts of plant breeding
IV.2 Techniques of hybridization, Emasculation, Bagging, Tagging
IV.4 Self pollinated plants: Pedigree method, Bulk method
IV.4 Horticulture: propagation methods (cutting, layering, budding and grafting)

UNIT: - V ANATOMY [14 marks]

V.1 Simple tissues
V.2 Complex tissues
V.4 Anomalous secondary growth in stem (Salvadora, Bougainvillea)
V.5 Histological techniques: Microtome, Block preparation, Sectioning and Staining

Semester – VI
New theory Syllabus
BOTANY PAPER: B-602
(PLANT PHYSIOLOGY, BIOCHEMISTRY, BIOSTATISTIC, MICROBIOLOGY AND BIODIVERSITY)

UNIT: - I PLANT PHYSIOLOGY [14 marks]

I.1 Germination: Different phases of germination, Factors affecting germination
I.2 Respiration: Pentose phosphate pathway (PPP)
I.3 Plant Growth Regulators (Auxins, Gibberellins, Cytokinins, Abscisic acid, Ethylene): biosynthesis and physiological functions
I.4 Stress Physiology: Light stress and Temperature stress- Injury and resistance

UNIT: - II BIOCHEMISTRY [14 marks]

II.1 Carbohydrates – classification, properties and functions
II.2 Proteins – classification and Structure and functions (Primary, secondary, tertiary and quaternary)
II.3 Lipids – classification, structure and functions
II.4 Enzymes – classification and inhibition

UNIT: - III BIOSTATISTIC [14 marks]

III.1 Concept of population and Sample
III.2 Measures of central tendency: Mean, Mode and Median
III.3 Measures of dispersion: Standard deviation, Coefficient of variation

UNIT: - IV MICROBIOLOGY [14 marks]

IV.1 Ultra structure of *E.coli* and T4 Phage
IV.2 Staining and sterilization methods
IV.3 Culture media and concept of pure culture
IV.4 Methods of population estimation, growth determination

UNIT: - V BIODIVERSITY [14 marks]

V.1 Concept of biodiversity
V.2 Different Levels in Biodiversity organization
V.3 Biodiversity conservation strategies
V.4 Biodiversity for human welfare

Semester – VI
New theory Syllabus
BOTANY PAPER: B-603
(INSTRUMENTATION, ADVANCE TECHNIQUYES IN BIOLOGY, FOREST AND FORESTERY, MEDICINAL PLANTS AND ECONOMIC BOTANY)

UNIT: - I **INSTRUMENTATION** **[14 marks]**

Principle, design, function of following instruments

I.1 Spectrophotometer
I.2 Autoclave
I.3 Incubator
I.4 Centrifuge
I.5 Oven

UNIT: - II **ADVANCE TECHNIQUES IN BIOLOGY** **[14 marks]**

II.1 TLC, HPLC, GC
II.2 Electrophoresis
II.3 PCR

UNIT: - III **FOREST AND FORESTRY** **[14 marks]**

III.1 Classification of Indian forests
III.2 Social forestry and Agricultural Forestry
III.3 Physical properties, structural features and identification of wood
III.4 Wild life and biosphere reserves
III.5 Study tour of rich biodiversity region of the country outside the state and students have to submit tour report

UNIT:-IV **MEDICINAL PLANTS** **[14 marks]**

IV.1 Scientific name, family, distribution, parts used and uses of following medicinal plants:

IV.1.1 Tulsi IV.1.2 Neem IV.1.3 Ardusi
IV.1.4 Ashwagandha IV.1.5 Bili IV.1.6 Nagod
IV.1.7 Eucalyptus

UNIT: - V **ECONOMIC BOTANY** **[14 marks]**

V.1 General account, methods of cultivation, botanical name, family and use:

V.1.1 Cereals (Wheat, Rice and Maize)
V.1.2 Pulses (Gram, green gram and Pea)
V.1.3 Beverages (Tea and coffee)
V.1.4 Oils (Groundnut and sesamum)
V.1.5 Spices (Taj, Laving, cardamom)

T.Y.B.Sc. – BOTANY
PRACTICAL – 1
Semester – V
(Based on paper B-501 – P)

1. Studies of *coleochetae* algae with help of class work materials and permanent slides for their vegetative and reproductive structures.
2. Studies of *caulerpa* algae with help of class work materials and permanent slides for their vegetative and reproductive structures.
3. Studies of *chara* algae with help of class work materials and permanent slides for their vegetative and reproductive structures.
4. Studies of *ectocarpus* algae with help of class work materials and permanent slides for their vegetative and reproductive structures.
5. Studies of *alternaria* fungi with help of class work materials and permanent slides for their vegetative and reproductive structures.
6. Studies of *peziza* fungi with help of class work materials and permanent slides for their vegetative and reproductive structures.
7. Studies of morphology, anatomy and reproductive structure of *pellia*.
8. Studies of morphology, anatomy and reproductive structure of *sphagnum*.
9. Studies of morphology, anatomy and reproductive structure of *ophioglossum*.
10. Studies of morphology, anatomy and reproductive structure of *marsilea*.
11. Study of plant diseases: Tikka disease of ground nut; Red rot of sugarcane; Whip smut of sugarcane; Citrus canker

PRACTICAL – 2
Semester – V
(Based on paper B-502 – P)

1. To study the anatomical structure of stem of *Ephedra* and *Gnetum by* section cuttings
2. To study the structure of leaf, leaf appendages, venation and stomata of *Ephedra* and *Gnetum*
3. To study the structure of the male and female cones of *Ephedra* and *Gnetum*
4. To study the different plant families mentioned in theory paper (minimum two plants should be studied in each family).
5. To study the different types of ovules through permanent slides:
6. Dissection and mounting of various types of embryo.

PRACTICAL – 3
Semester – V
(Based on paper B-503 – P)

1. To determine the minimum size of the quadrate by species area curve.
2. To demonstrate the frequency of various species occurring in a given area.
3. To demonstrate the density and abundance of various species occurring in given area.
4. To demonstrate water holding capacity.
5. Test for the presence of carbonate, nitrate and deficiency of replaceable bases.
6. Test for the presence of inorganic salts in the soil samples.
7. Comparison of dissolved oxygen (DO) content of polluted and non-polluted water by iodometric titration method.
8. Estimation of water hardness.
9. Estimation of Biological oxygen demand (BOD)

PRACTICAL – 4
Semester – VI
(Based on paper B-601 – P)

1. Demonstration of salivary gland chromosomes from *Chironomous* larva by Aceto orcein technique.
2. To study the mitosis by Squash technique of onion root tip.
3. To study meiosis by smear technique
4. To understand the concept of gene expression through chart method.
5. To study the different plant tissues by using appropriate materials.
6. To study the anomalous secondary growth in stem (salvadora and Bougainvillea)
7. To study the histological techniques : Microtome, Block preparation
8. Section cutting through microtome (In practical exam readymade bock will be provided to the student).
9. Staining (In practical exam readymade slide will be provided to the students for staining).

PRACTICAL – 5
Semester – VI
(Based on paper B-602 – P)

1. To demonstrate the phenomenon of dialysis
2. To extract and separate chloroplast pigments by solvent method and demonstrate fluorescence in chloroplast extracts.
3. Preparation of solutions: Molar, Molal, Normal, Percent Concentrations
4. Qualitative analysis of carbohydrates (Fehling's test, Benedict's test, Barfoed's test, Molisch's test, Anthrone test)
5. Qualitative analysis of priteins (Xanthoproteic Reaction, Millon's test, Hopkin's test)
6. Biuret test for protein estimation.
7. Estimation of fatty acid by titration
8. Qualitative analysis of Amylase enzymes.
9. Calculation of central tendencies –mean, median and mode (minimum three exercise)
10. Calculation of standard deviation (minimum three exercise)
11. To study the bacterial cell morphology through Gram's staining.

PRACTICAL – 6
Semester – VI
(Based on paper B-603 – P)

1. To study the principle, functions and applications of the instruments mentioned in the theory.
2. To prepare the TLC slides and separate the given biological mixtures.
3. Separation of protein through electrophoresis technique
4. To measure the height of the trees in college campus.
5. Find out the basal cover and canopy cover of the plants of college campus.
6. Identification and characteristics of wood samples: (a) *Tectona grandis* (b) *Eucalyptus sp*. (c) *Acacia arabica*
7. Extraction of phyto-pharmaceuticals:
   8.1 Extraction of calcium citrate from lemon
   8.2Isolation of starch from potatoes
8. Separation of plant extraction and application of separated plant ingredients as source of medicines: Tulsi, Neem and Ardushi
9. Prepare ten herbarium sheets for submission.
10. Utilization of plants for human welfare: Cereals, Pulses, Beverages, Oils and Timber
11. To study the medicinal plants as per theory syllabus - Tulsi , Neem , Ardusi, Ashwagandha, Bili , Nagod , Eucalyptus

T.Y.B.Sc. – BOTANY PRACTICAL SKELETON

Semester – V **Practical – 1**

(Based on paper B-501 – P)

Times: - 3 hours **Total Marks: - 35**

Q – 1	Identify & describe with labeled diagram **Specimen A & B**	**[08]**
Q – 2	Identify & Classify with reasons **Specim C and D**	**[08]**
Q – 3	Expose & show the preparation of **Specimen E** to the examiner	**[05]**
Q – 4	Rotation: Identify & Describe **Specimen F, G, H**	**[06]**
Q – 5	(a) Viva voce	**[05]**
	(b) Certified Journal	**[03]**

T.Y.B.Sc. – BOTANY PRACTICAL SKELETON

Semester – V **Practical – 2**

(Based on paper B-502 – P)

Times: - 3 hours **Total Marks: - 35**

Q – 1	Identify & describe with labeled diagram **Specimen A & B**	**[08]**
Q – 2	Identify the given family and dissect the flower and expose the floral parts show it to examiner **Specimen C**	**[03]**
Q – 3	Classify with reasons & draw the floral diagram and floral formula of **Specimen D&E**	**[08]**
Q – 4	Prepare the slides of given materials **Specimen F**	**[04]**
Q – 5	Rotation: Identify & Describe **Specimen G, H**	**[04]**
Q – 6	(a) Viva voce	**[05]**
	(b) Certified Journal	**[03]**

T.Y.B.Sc. – BOTANY PRACTICAL SKELETON

Semester – V **Practical – 3**

(Based on paper B-503 – P)

Times: - 3 hours **Total Marks: - 35**

Q – 1	Find out the frequency / density of _____ plant species	**[05]**
Q – 2	Measure the water holding capacity of given soil sample	**[03]**
Q – 3	Find out the presence of carbonate, nitrate / inorganic salts in a given samples	**[05]**
Q – 4	Measure the dissolved oxygen (DO) of given water sample	**[07]**
Q – 5	Estimation of hardness of given water sample	**[07]**
Q – 6	(a) Viva voce	**[05]**
	(b) Certified Journal	**[03]**

T.Y.B.Sc. – BOTANY PRACTICAL SKELETON

Semester – VI **Practical – 4**

(Based on paper B-601 – P)

Times:- 3 hours **Total Marks:- 35**

Q – 1	Prepare the slide of giant chromosome slide	**[05]**
Q – 2	Perform the exercise of mitosis / meiosis	**[05]**
Q – 3	Take the thin section of given specimen A and - show the _____ tissues to the examiner	**[05]**
Q – 4	Take the thin section of given specimen B (anomalous - secondary growth) and show the examiner	**[05]**
Q – 5	Prepare a slide of given specimen C with double staining method- and show it to the examiner	**[07]**
Q – 6	(a) Viva voce	**[05]**
	(b) Certified Journal	**[03]**

T.Y.B.Sc. – BOTANY PRACTICAL SKELETON

Semester – VI **Practical – 5**

(Based on paper B-602 – P)

Times: - 3 hours **Total Marks: - 35**

Q – 1	Perform the qualitative test for Carbohydrate / Protein / Enzyme	**[05]**
Q – 2	Calculation of Central tendencies	**[04]**
Q – 3	Calculation of standard deviation	**[05]**
Q – 4	Gram Staining	**[05]**
Q – 5	Perform the exercise given by the examiner ……	**[08]**
Q – 6	(a) Viva voce	**[05]**
	(b) Certified Journal	**[03]**

T.Y.B.Sc. – BOTANY PRACTICAL SKELETON

Semester – VI **Practical – 6**

(Based on paper B-603 – P)

Times: - 3 hours **Total Marks: - 35**

Q – 1	Perform the exercise given by the examiner …… (TLC / tree height)	**[04]**
Q – 2	Extract out the given plant materials	**[02]**
Q – 3	Rotation - specimen A, B and C	**[06]**
Q – 4	Tour report and institutional visit	**[10]**
Q – 5	Submission work	**[05]**
Q – 6	(a) Viva voce	**[05]**
	(b) Certified Journal	**[03]**

T.Y.B.Sc. – BOTANY PROJECT WORK

Semester – VI

Times: - 3 hours **Total Marks: - 100**

Project work: The repot of the project work should be submitted for assessment.

A list of reference books

1.	A text book of Algae	A.V.S.S.Sambamurty
2.	A text book of Botany	Singh, Pande & Jain
3.	A textbook of ecology	Vashistha & Gill
4.	A textbook of economic Botany	V.Verma
5.	A textbook of Practical Botany Vol.–I & Vol.–II	Bendra & Kumar
6.	A textbook of Systematic Botany	R.N.Sutaria
7.	Algae	B.R.Vashishta
8.	Algae	G.L.Chopra
9.	An Introduction to plant tissue culture	M.K.Razdan
10.	An introduction to taxonomy of angiosperms	Shukla P. & S.P.Sharma
11.	Anatomy and embryology	Singh, Pandey & Jain
12.	Applied Plant Biotechnology	V.L.Chopra
13.	Basic concept in biochemistry	H.F.Gilbert
14.	Biochemistry	Lehninger
15.	Biochemistry	S.K.Dasgupta
16.	Biostatistics	P. Ramakrishnan
17.	Biotechnology	M.D.Trevan & et.al
18.	Bryophytes	B.R.Vashishta
19.	College Botany Vol. – I & Vol. – II	B.P.Pandey
20.	Cryptogamic Botany Vol. – I & Vol. – II	G.M.Smith
21.	Ecology and Environment	P.D.Sharma
22.	Ecology and Soil Science	Shukla & Sharma
23.	Ecology and sustainable development	S.Ramkrishnan
24.	Economic Botany	B.P.Pandey
25.	Embryology	P.Maheshwary
26.	Forest and Forestery	K.P.Sagariya
27.	Fundamental of biochemistry	V.K.Jain
28.	Fundamentals of Ecology	E.P.Odum

29. Gene IX — Benzamin & lewin
30. Genetics Today — Jagjit Singh
31. Genetics — A.M.Winchester
32. Gymnosperms — O.P.Sharma
33. Indian manual of plant ecology — Mishra & Puri
34. Instant Note in Ecology — Aulay. Mackenzie & et.al
35. Instant Notes : Biochemistry — B.D.Hames & N.M.Hooper
36. Instant Notes : Genetics (bioinformatics – p.no. 288) P.C.Winter & et.al
37. Instant Notes : Genetics — P.C.Winter & et.al
38. Instant Notes : Molecular Biology — P.C.Turner & at.al
39. Introduction to bioinformatics — T.K.Attwood & D.J.Parry Smith
40. Introduction to fungi — Dayal & Raizada
41. Introductory Biostatistics — Chap.T.Le
42. Laboratory manual in Biochemistry — J.Jayraman
43. Medicinal Plants — S.K.Jain
44. Microbiology Vol. – I & Vol. - II — P.D.Sharma
45. Modern Phytomedicine — Iqbal Ahmad & et.al.
46. Plant Anatomy — B.P.Pandey
47. Plant Anatomy — P.J.Chandurkar
48. Plant Physiology — P.L.Kocchar
49. Plant Physiology — Pandey & Sinha
50. Plant Physiology — Salisbury & Ross
51. Plant Physiology — V.K.Jain
52. Plant Physiology — V.Verma
53. Plant tissue culture: Application and limitation — S.S.Bhojwani
54. Practical Pharmacognosy — C.K.Kokate
55. Pteridophyta : New look — O.P.Sharma
56. Pteridophytes — P.C.Vashishta
57. Taxonomy of angiosperms — B.P.Pandey
58. Taxonomy of angiosperms — V.H.Naik
59. The Embryology of Angiosperms — Bhojwani & Bhatnagar
60. The fungi — B.P.Pandey
61.Plant breeding : Principles and Methods, — B. D. Singh, Kalyani Publisher