



**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,  
NANDED**

**SEMESTER PATTERN CURRICULUM UNDER  
CHOICE BASED CREDIT SYSTEM (CBCS)  
for  
Faculty of Science and Technology  
Under Graduate Program**

**SUBJECT: BOTANY**

**B. Sc. First Year**

**With Effect from June 2019..**

*Ganesh*  
Principal

Late. Babasaheb Deshmukh  
Gorthekar Arts, Commerce  
& Science Mahavidyalaya,  
Umri, Dist. Nanded. [M.S.]

॥ सा विद्या या विमुक्तये ॥

# स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

"ज्ञानतीर्थ" परिसर, विष्णुपुरी, नांदेड - ४३१६०६ (महाराष्ट्र)

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED**

"Dnyanteerth", Vishnupuri, Nanded - 431606 Maharashtra State (INDIA)

Established on 17th September 1994 - Recognized by the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'A' Grade

25

1994 - 2019

SILVER JUBILEE YEAR

## ACADEMIC (I-BOARD OF STUDIES) SECTION

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संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील प्रथम वर्षाचे CBCS Pattern नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०१९-२० पासून लागू करण्याबाबत.

## प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, दिनांक ०८ जून २०१९ रोजी संपन्न झालेल्या ४४व्या मा. विद्या परिषद बैठकीतील ऐनवेळचा विषय क्र.११/४४-२०१९ च्या ठरावानुसार प्रस्तुत विद्यापीठाच्या संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील प्रथम वर्षाचे खालील विषयांचे C.B.C.S. (Choice Based Credit System) Pattern नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०१९-२० पासून लागू करण्यात येत आहेत.

1. Agricultural Microbiology
2. Agrochemicals & Fertilizers
3. Analytical Chemistry
4. B.C.A.
5. B. Voc. (Food Processing, Preservation and Storage)
6. B. Voc. (Web Printing Technology)
7. Biochemistry
8. Bioinformatics
9. Biophysics
10. Biotechnology (Vocational)
11. Biotechnonology
12. Botany
13. Chemistry
14. Computer Application (Optional)
15. Computer Science (Optional)
16. Computer Science
17. Dairy Science
18. Dyes and Drugs
19. Electronics
20. Environmental Science
21. Fishery Science
22. Food Science
23. Geology
24. Horticulture
25. Industrial Chemistry
26. Information Technology (Optional)
27. Mathematics
28. Microbiology
29. Network Technology
30. Physics
31. Software Engineering
32. Statistics
33. Zoology

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या [www.srtmun.ac.in](http://www.srtmun.ac.in) या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी.

'ज्ञानतीर्थ' परिसर,

विष्णुपुरी, नांदेड - ४३१ ६०६.

जा.क्र.: शैक्षणिक-०१/परिपत्रक/पदवी-सीबीसीएस अभ्यासक्रम/  
२०१९-२०/२९२

दिनांक : ०३.०७.२०१९.

प्रत माहिती व पुढील कार्यवाहीस्तव :

- १) मा. कुलसचिव यांचे कार्यालय, प्रस्तुत विद्यापीठ.
- २) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
- ३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
- ४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
- ५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
- ६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.

स्वाक्षरित/-

उपकुलसचिव

शैक्षणिक (१-अभ्यासमंडळ) विभाग

*Ganesh*  
Principal  
Late Babasaheb Deshmukh  
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## Introduction:

The University Grants Commission (UGC) has initiated several measures to bring equity, efficiency and excellence in the Higher Education System of country. The important measures taken to enhance academic standards and quality in higher education include innovation and improvements in the curriculum, teaching-learning process, examination and evaluation systems, besides governance and other matters.

Swami Ramanand Teerth Marathwada University has several initiatives towards academic excellence, quality improvement and administrative reforms. In view of this priority and in-keeping with Vision and Mission, process was already initiated towards introduction of semester system, grading system and credit system. University had implemented Choice Based Credit System (CBCS) pattern at UG level from the academic year 2016-2017 progressively.

Revision and updating of the curriculum is the continuous process to provide an updated education to the students at large. In view of this priority and in-keeping with Vision and Mission, process of revision and updating the curriculum is initiated and implemented at UG level from the academic year 2019-2020 progressively. Presently there is wide diversity in the curriculum of different Indian Universities which inhibited mobility of students in other universities or states. To ensure uniform curriculum at UG level, curriculum of different Indian Universities, syllabus of NET, SET, MPSC, UPSC, Forest Services and the UGC model curriculum are referred to serve as a base in updating the same.

The CBCS provides choice for students to select from the prescribed courses. The choice based credit system provides a 'cafeteria' type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning. Our university has already introduced the choice based credit system. The semester system accelerates the teaching-learning process and enables vertical and horizontal mobility in learning.

Keeping in mind BoS in Botany prepared the curriculum to ensure up-to-date level of understanding of plant sciences. Studying plant sciences prepares the students for a career working either in an educational institution or an industry in which they can be directly involved in the research and development and Knowledge of modern and applied plant science and excellent career prospects.

The study of Botany aims to expand and increase current knowledge about plants in order to

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some problems in many fields including agriculture, ecology, medicine, biotechnology and horticulture are some of the objectives kept in mind during executing the syllabus.

How plants function at the cellular, tissue, organ, and organismal levels? How evolution of plants and how they contribute to biodiversity. How interactions with each other impacts their physical environment are the core objectives.

The addition of Skill enhancement courses aims to develop skills in plant sciences and practical experience in the students.

At the end of the curriculum, the student should have increased: an aptitude towards science and nature and also undertakes the fundamental and applied research in plant science in the benefit of the human and nature.

At last comments, suggestions are welcome from all the teachers, stakeholders and students for the upbringing the curriculum.

### **Salient Features :**

The syllabus of B Sc Botany has been framed to meet the requirement of Choice Based Credit System. The courses offered here in will train and orient the students in the specific fields of Botany.

The Section A of DSEB deals with Cell Biology, Genetics & Molecular Biology, Plant Breeding & Biotechnology. The Section B of DSEB with choice provides an option to learn courses like Plant Pathology, Analytical Techniques in Plant Sciences, Herbal Drug Technology, Plant Systematics, Research Methodology and Bioinformatics .

This would help students to lay a strong foundation in the field of Botany.

Overall after completion of this course, students will also acquire fundamental knowledge in Plant Science and also understand that Botany is an integral part of the human life and developments.

Skill Enhancement Courses offered during third year of this program are being designed with the aim of imparting specific skills to the students which will lead to the self employability through development of their own enterprises.

  
**Principal**

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## Utility of Program

This program will train and orient the students in the field of diversity of different life forms of plants and microbes, Plant Ecology, Taxonomy of Angiosperms, Plant Anatomy, Plant Embryology, Plant Physiology, Plant Metabolism and Biochemistry, Cell Biology, Genetics & Molecular Biology, Plant Pathology, Analytical Techniques in Plant Sciences, Herbal Drug Technology, Plant Breeding & Biotechnology, Plant Systematics, Research Methodology and Bioinformatics in relation to Environment and Agriculture as well as Biotechnological, Pharmaceutical and Herbal Industries. This will help the students for their career development. Skill Enhancement Courses being offered during this program will provide job opportunities and additional specific skills to the students for self employability through the development of their own enterprises.

## Learning Objectives :

The Objective of this program are :

1. To provide an updated education to the students at large in order to know the importance and scope of the discipline and to provide mobility to students from one university or state to other.
2. To update curriculum by introducing recent advances in the subject and enable the students to face NET, SET, UPSC and other competitive examinations successfully.
3. To impart knowledge of plant science as the basic objective of Education.
4. To develop a scientific attitude to make students open minded, critical and curious.
5. To develop an ability to work on their own and to make them fit for the society.
6. To expose themselves to the diversity amongst life forms.
7. To develop skill in practical work, experiments, equipments and laboratory use along with collection and interpretation of plant materials and data.
8. To make aware of natural resources and environment and the importance of conserving the same.
9. To develop ability for the application of the acquired knowledge in the fields of life so as to make our country self reliant and self sufficient.

  
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1. To appreciate and apply ethical principles to plant science research and studies.

**Prerequisite :**

The optional courses are offered to the students registered for undergraduate programs. Such students should have the basic knowledge of Plant Science and willing to gain additional knowledge in the field of Botany. Admissions to B Sc course are given as per the University rules.

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Faculty of Science and Technology**



**SUBJECT: BOTANY**

**CLASS: B. Sc. FIRST YEAR**

**An Outline:**

Semester/ Annual	Course Name		Paper No. & Title	Total Periods (periods/ week)	Marks for		Credits (Marks)
					External (ESE)	Internal (CA)	
Semester-I	CCB-I	Section-A	<b>Theory Paper-I:</b> Viruses, Bacteria Algae , Fungi , Lichens and Mycorrhiza	45 (03/week)	40	10	Credits: 02 (Marks:50)
		Section-B	<b>Theory Paper-II:</b> Plant Ecology , Phytogeography and Environmental Biology	45 (03/week)	40	10	Credits: 02 (Marks:50)
Semester-II	CCB-II	Section-A	<b>Theory Paper-III:</b> Bryophytes, Pteridophytes Gymnosperms and paleobotany	45 (03/week)	40	10	Credits: 02 (Marks:50)
		Section-B	<b>Theory Paper-IV:</b> Taxonomy of Angiosperms	45 (03/week)	40	10	Credits: 02 (Marks:50)
Annual pattern	CCBP-I		<b>Practical Paper-V:</b> Practicals based on theory papers of CCB-I&II	24 Prac. (03/week/ batch)	80	20	Credits: 04 (Marks:100)
Total					240	60	Credits: 12 (Marks:300)

**CCB:** Core Course Botany, **CCBP:** Core Course Botany Practical, **ESE:** End Semester Examination, **CA:** Continues Assessment,

**Distribution of Credits:** 80 % of the total credits for the ESE and 20% for CA

**CA of 10 Marks ( Theory ) :** 05 Marks for test & 05 Marks for Assignment

**CA of 20 Marks ( Practicals):** : 10 Marks for test & 10 Marks for Record Book ,Submission of collection and field note and Excursion Report.

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**CBASS : B.Sc. SECOND YEAR**

**Ap Outline:**

Semester/ Annual	Course No.	Course Name	Instruction Hrs/week	Total Periods	Marks for		Credits (Marks)	
					Internal (CA)	External (ESE)		
Semester-III	CCB-III (Section-A)	<b>Theory Paper-VI:</b> Plant Anatomy	03	45	10	40	Credits: 02 (Marks:50)	
	CCB-III (Section-B)	<b>Theory Paper-VII:</b> Plant Physiology	03	45	10	40	Credits: 02 (Marks:50)	
Semester-IV	CCB-IV (Section-A)	<b>Theory Paper-VIII:</b> Plant Embryology	03	45	10	40	Credits: 02 (Marks:50)	
	CCB-IV (Section-B)	<b>Theory Paper-IX:</b> Plant Metabolism and Biochemistry	03	45	10	40	Credits: 02 (Marks:50)	
Annual Pattern	CCBP-II	<b>Practical Paper-X:</b> Practicals based on CCB-III (Section-A) CCB-IV (Section-A)	03	16 Practicals	10	40	Credits: 02 (Marks:50)	
	SECB-I	SEC- I A OR B		45	25	25	Credits: 02 (Marks:50)	
Annual Pattern	CCBP-III	<b>Practical Paper-XI:</b> Practicals based on CCB-III (Section-B) CCB-IV (Section-B)	03	16 Practicals	10	40	Credits: 02 (Marks:50)	
	SECB-II	SEC- II A OR B	03	45	25	25	Credits: 02 (Marks:50)	
Total Credits Semester-III and IV						Marks: 60+50= 110	Marks: 240+50=290	Credits: 12+04=16 (Marks: 300+100 =400)

**ESE** : End Semester Examination, **CA** : Continues Assessment, **SECB**: Skill Enhancement Course Botany, **CCB**: Core Course Botany, **CCBP**: Core Course Botany Practical.

**Distribution of Credits:** 80 % of the total credits for the ESE and 20% for CA

**CA of 10 Marks ( Theory ) :** 05 Marks for test & 05 Marks for Assignment

**CA of 10 Marks ( Practicals) :** : 05 Marks for test & 05 Marks for Record Book ,Submission of collection and field note and Excursion Report.

**CA of 25 Marks :** 15 Marks for Seminar & 10 Marks for Test

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Class : B.Sc. THIRD YEAR  
An Outline:

Semester/ Annual	Course No		Name of the Course	Total Periods (Periods/ Week)	Marks for		Credits (Marks)
					External (ESE)	Internal (CA)	
Semester-V	DSEB-I	Section - A	<b>Theory Paper- XII:</b> Cell Biology, Genetics & Molecular Biology	45 (03/week)	40	10	Credits:02 (Marks: 50)
		Section - B	<b>Theory Paper- XIII:</b> <b>B I:</b> Plant Pathology OR <b>B II:</b> Analytical Techniques in Plant Sciences OR <b>B III:</b> Herbal Drug Technology	45 (03/week)	40	10	Credits:02 (Marks: 50)
Semester-VI	DSEB-II	Section - A	<b>Theory Paper- XIV:</b> Plant Breeding & Biotechnology	45 (03/week)	40	10	Credits:02 (Marks: 50)
		Section - B	<b>Theory Paper- XV:</b> <b>B I:</b> Plant Systematics OR <b>B II:</b> Research Methodology OR <b>B III:</b> Bioinformatics	45 (03/week)	40	10	Credits:02 (Marks: 50)
Annual Pattern	DSEBP- I (DSEB I & II Section A)	--	<b>Practical Paper XVI:</b> Practicals based on theory papers- XII & XIV	16 Pract. (03/week/ Batch)	40	10	Credits:02 (Marks: 50)
	SECB III	--	SEC- III A Or B	01 Skill (03/week/ Batch)	25	25	Credits:02* (Marks: 50)
Annual Pattern	DSEBP- II (DSEB I & II)	--	<b>Practical Paper XVII:</b> Practicals based on theory	16 Pract. (03/week/ Batch)	40	10	Credits:02 (Marks: 50)

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	Section B)		papers- XIII & XV				
	SECB IV	--	SEC- IV A OR B	01 Skill (03/week/ Batch)	25	25	Credits:02* (Marks: 50)
<b>Total Credits Semester -V &amp; VI</b>					240+50 = 290	60+50 =110	Credits:12+4* = 16 (Marks: 300+100* = 400)

ESE : End Semester Examination, CA : Continues Assessment, SECB: Skill Enhancement Course Botany, DSEB:

Discipline Specific Elective Botany, DSEBP: Discipline Specific Elective Botany Practical

**Distribution of Credits:** 80 % of the total credits for the ESE and 20% for CA

**CA of 10 Marks ( Theory) :** 05 Marks for test & 05 Marks for Assignment

**CA of 10 Marks ( Practicals):** : 05 Marks for test & 05 Marks for Record Book ,Submission of collection and field note and Excursion Report.

**CA of 25 Marks :** 15 Marks for Seminar & 10 Marks for Test

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Semester pattern curriculum under  
Choice Based Credit System (CBCS) for  
**BOTANY**  
B.Sc. F.Y.  
Semester – I  
CCB-I (A)  
Theory Paper –I

Viruses ,Bacteria, Algae, Fungi, Lichens and Mycorrhiza

Periods – 45

Credits :02  
Maximum Marks – 50

**Learning Objectives**

1. To study and impart knowledge about the occurrence, distribution, structure and life history of lower plants such as algae, fungi, lichens
2. To instill in students an appreciation for the diversity of plant forms and structural organization that exists within plant bodies that allow plants to develop and live as integrated organisms in diverse environments

**Learning outcomes:**

1. Understand the morphology, structure and importance of the various organisms
2. Differentiate between various groups of Algae, Fungi, Bacteria, Viruses, and Lichens & Mycorrhiza
3. Learn the life cycles of individuals belonging to Algae, Fungi, Bacteria, Viruses, Lichens & Mycorrhiza

**Unit I: Microbes (10 Lectures)**

Viruses –Introduction, general characters of viruses, replication (general account), and RNA virus (TMV); Economic importance; study of yellow vein mosaic of Bendi

Bacteria – Introduction, General characters and cell structure; Reproduction – vegetative, asexual (Binary Fission) and recombination (conjugation,) Study of Citrus Canker and Economic importance of Bacteria.

  
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### Unit II: Algae (12 Lectures)

Introduction, General characters, Ecology and distribution; Range of thallus organization and reproduction; Classification of algae (F. E. Fritch's 1935); Morphology and life-cycles of the following: *Nostoc*, *Oedogonium* and *Ectocarpus*. Economic importance of algae

### Unit III: Fungi (13 Lectures)

Introduction- General Characteristics, ecology and significance, cell wall composition, nutrition, reproduction and classification (Alexopolous & Mims 1979); General characteristics, ecology, significance and life cycle of, *Penicillium*, *Alternaria* (Deuteromycota), *Agaricus* (Basidiomycota).

### Unit IV: Lichens and Mycorrhiza (10 Lectures)

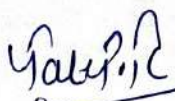
Lichens: General characters, types and economic importance.

Mycorrhiza: General characters, ectomycorrhiza and endomycorrhiza and their significance

### Theory paper-I: Viruses ,Bacteria, Algae, Fungi, Lichens and Mycorrhiza

#### Unit wise distribution of periods and marks:

Unit	Title	Periods Allotted	Maximum Marks
I	Microbes	10	28
II	Algae	12	28
III	Fungi	13	28
IV	Lichens and Mycorrhiza	10	28
	<b>Total</b>	<b>45</b>	<b>112</b>

  
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**BOTANY**

B.Sc. F.Y.

Semester – I

CCB-I (B)

Theory Paper –II

Plant Ecology ,Phytogeography and Environmental Biology



Periods – 45

Credits :02  
Maximum Marks – 50

**Learning Objectives:**

1. Acquainted with basic concepts of Ecology , Ecosystem Ecological factors, community ecology and phytogeography
2. To provide students with skills necessary for Ecological studies

**Learning outcomes:**

1. Able to understand the ecological principles , interactions taking place in the Ecosystems and the flow of energy
2. Learn about the concept of phytogeography and its relations with other disciplines

**Unit I: Ecological Factors (10 Lectures)**

Introduction, Scope of Ecology, Ecological Factors: Climatic factors- Light, Temperature, Wind, Humidity. Edaphic factors- Soil moisture, Temperature, Soil pH, Soil formation, Composition and Soil profile.

**Unit II: Ecological Adaptations (11 Lectures)**

Morphological and anatomical adaptations in Hydrophytes (*Hydrilla* stem and *Nymphaea* petiole), Xerophytes ( *Nerium* leaf and *Casuarina* stem). General characters of Halophytes and Epiphytes.

**Unit III: Ecosystem and Plant Communities (12 Lectures)**

Ecosystem: Introduction, Structure, types (Pond ecosystem and Forest ecosystem), Tropic levels, Energy flow in ecosystem, food chain, food web and ecological pyramids.

  
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Community ecology: Community characteristics, Frequency, Density, Life forms and ecological succession (Hydrosere), Analysis of Plant communities (quadrant method).

**Unit IV: Phytogeography and Environmental Biology (12 Lectures)**

Introduction, Bio-geographical regions of India, Bio-diversity hot spots of India

Environmental pollution: Air, Water and soil pollution (Causes, effects and control measures),

Soil erosion and soil conservation, afforestation, deforestation and Chipko movement,

Environmental education and awareness.

**Theory paper-II: – Plant Ecology, Phytogeography and Environmental Biology**

**Unit wise distribution of periods and marks:**

Unit	Title	Periods Allotted	Maximum Marks
I	Ecological Factors	10	28
II	Ecological Adaptations	11	28
III	Ecosystem and Plant Communities	12	28
IV	Phytogeography and Environmental Biology	12	28
	<b>Total</b>	<b>45</b>	<b>112</b>

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B.Sc. F.Y.

Semester – II

CCB-II (A)

Theory Paper –III

**Bryophytes, Pteridophytes, Gymnosperms & Paleobotany**

Periods – 45

Credits :02

Maximum Marks – 50

**Learning Objectives:**

1. To study the occurrence, distribution, structure and life history of bryophytes, pteridophytes and gymnosperms
2. To provide students with skills in paleobotany studies

**Learning outcomes:**

1. Learn the life cycles of individuals belonging to Bryophytes, Pteridophytes and Gymnosperms
2. Learn about process of fossil formation and fossils plants

**Unit I: Bryophytes (10 Lectures)**

General characters, Classification (N.S.Parihar), morphology, anatomy and reproduction of *Marchantia* and *Funaria*. (Developmental study not expected), Economic importance of bryophytes.

**Unit II: Pteridophytes (13 Lectures)**

General characters, classification ( N.S.Parihar), morphology, anatomy and reproduction of *Lycopodium* and *Marsilea*. (Developmental study not expected), Homospory, Heterospory and seed habit, stelar evolution, economical importance of Pteridophytes.

**Unit III: Gymnosperms (12 Lectures)**

General characters, classification (K.R.Sporne, 1964), morphology, anatomy and Reproduction of *Cycas* and *Pinus*. (Developmental study not expected), Ecological and Economic importance.

  
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**Unit-IV: Paleobotany (10 Lectures)**

Introduction to palaeobotany, process of plant fossilization, types of fossils, geological time scale, Study of fossil Gymnosperms-*Lyginopteris oldhamia* (stem), *Bennettites* (flower) and General characters of *Ginkgo* (A living fossil).

**Theory paper-III: –Bryophytes, Pteridophytes Gymnosperms & Paleobotany**

**Unit wise distribution of periods and marks:**

Unit	Title	Periods Allotted	Maximum Marks
I	Bryophytes	10	28
II	Pteridophytes	13	28
III	Gymnosperms	12	28
IV	Paleobotany	10	28
	<b>Total</b>	<b>45</b>	<b>112</b>

  
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SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Semester pattern curriculum under  
Choice Based Credit System (CBCS) for  
**BOTANY**  
B.Sc. F.Y.  
Semester – II  
CCB-II (B)  
Theory Paper –IV  
Taxonomy of Angiosperms

Periods – 45

Credits :02  
Maximum Marks – 50

**Learning Objectives:**

1. To study the types of classifications- artificial, Natural and phylogenetic
2. To study the principles and rules of ICN and taxonomical terminology
3. To study the various plant families and their economic importance

**Learning Outcomes:**

1. Proficiency with the basic terminology of plant morphology
2. Able to identify the major families of plants and their economic importance
3. Understand the methods of collecting and preserving plants

**Unit I: Introduction (10 Lectures)**

Aims of Taxonomy, Principles of Taxonomy, Identification, Nomenclature and Classification, Principles and rules of ICN (Rank of taxa, typification, author citation) Importance of Herbarium, important herbaria and botanical gardens of the India.

**Unit II: Plant Classification (11 Lectures)**

Taxonomic hierarchy, Types of classification-artificial, natural and; phylogenetic. Bentham and Hooker, Engler and Prantl (up to family level with reference to families mentioned in the syllabus).

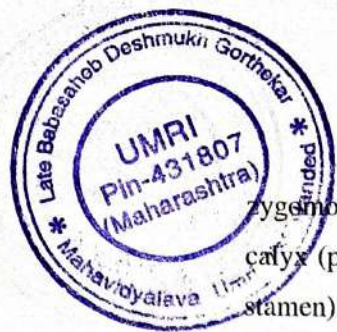
**Unit III: Morphology of Angiosperms (12 Lectures)**

Root: Definition, characters, types (tap root and adventitious) and functions. Stem: Definition, characters and functions. Leaf: Definition, structure of typical leaf (Hibiscus), functions, types- Simple (Hibiscus), Compound (unipinnate, bipinnate, tripinnate, unifoliate, bifoliate, trifoliate, multifoliate), venation- definition, types (reticulate, parallel), Phyllotaxy. Inflorescence: Definition, types- Racemose (characters), Cymose (characters). Flower: Definition, symmetry, actinomorphic,

16

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zygomorphic, types (hypogynous, epigynous, perigynous), structure of typical flower (Hibiscus), calyx (polysepalous, gamosepalous), corolla (polypetalous, gamopetalous), Androecium (parts of a stamen), Gynoecium –structure of carpel, apocarpous, syncarpous, placentation (axile, parietal, free central, marginal, basal) Fruit: Definition, forms- simple (dry, legume, fleshy, berry), aggregate (Etario of berries), composite (Sorosis).

**Unit IV: Study of Plant Families (12 Lectures)**

Study of vegetative and floral characters of following families: Brassicaceae, Fabaceae, Solanaceae, Lamiaceae and Poaceae .

**Theory paper-III: – Taxonomy of Angiosperms**

**Unit wise distribution of periods and marks:**

Unit	Title	Periods Allotted	Maximum Marks
I	Introduction	10	28
II	Plant Classification	11	28
III	Morphology of Angiosperms	12	28
IV	Study of Plant Families	12	28
	<b>Total</b>	<b>45</b>	<b>112</b>

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B.Sc. General (Semester Pattern)

Choice Based Credit System (CBCS) Pattern

B. Sc. F.Y.

Annual Pattern

CCBP- I

PRACTICAL PAPER-V: BASED ON THEORY PAPERS-I, II, III & IV

Practicals-24

Credits: 04 Maximum Marks – 100

Practical Exercises:

1. Study of morphology of Bacteria by Gram staining method
2. Study of citrus canker disease
3. Study of symptoms of yellow vein mosaic of Bendi
4. Study of Algae : Systematic position and external features of *Nostoc*, *Oedogonium*, ,  
*Ectocarpus*
5. Study of Fungi: systematic position, external and internal features of *Penicillium*,  
*Alternaria*, *Agaricus*
6. Study of different forms of Lichens
7. Study of ectomycorrhiza and endomycorrhiza
8. Study of *Marchantia*- morphology of thallus, w.m. rhizoids and scales, v.s. thallus  
through gemma cup, w.m. gemmae (all temporary slides), v.s. antheridiophore,  
archegoniophore, L.S..of sporophyte (all permanent slides)
9. Study of *Funaria*- morphology, w.m. leaf, rhizoids, operculum, peristome, annulus,  
spores (temporary slides); permanent slides showing antheridial and archegonial heads,  
L.S.of capsule and protonema
10. *Lycopodium*- morphological and anatomical study
11. *Marsilea*- morphological and anatomical study of petiole and rhizome
12. *Cycas*- morphology ,T.S of. rachis, T.S.of leaflet, male and female cone
13. *Pinus*- morphology (long and dwarf shoots, w.m. dwarf shoot, male and female cone).
14. Study of fossil Plants
15. Estimation of soil Bulk density and porosity

18

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- Study of morphological and anatomical adaptations of hydrophytes (*Hydrilla* stem and *Nymphaea* petiole) and xerophytes (*Nerium* leaf and *Casuarina* stem)
17. Determination of dissolved oxygen ( DO) in water samples
  18. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus
  19. Quantitative analysis of herbaceous vegetation in the college campus
  20. Study of vegetative and floral characters of the following families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification):  
Brassicaceae , Fabaceae , Solanaceae , Lamiaceae , Poaceae.
  21. Excursion/ study tour for plant specimen collection

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SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

**BOTANY – CURRICULUM**  
**B.Sc. General (Semester Pattern)**  
**Choice Based Credit System (CBCS)**

**Skeleton Question Paper**  
**B. Sc. First Year (w.e.f. 2019-2020)**

**Theory Paper**

**Maximum Marks: 40**

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**Note: -** (i) Attempt all questions  
(ii) Draw neat and well labeled diagrams wherever necessary

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- |  |          |
|--|----------|
| Q1. Essay Type Question  | 15 marks |
| OR   |          |
| a) Short Question  | 08 marks |
| b) Short Question  | 07 marks |
| (Based On Unit I, II)  |          |
| Q2. Essay Type Question  | 15 marks |
| OR   |          |
| a) Short Question  | 08 marks |
| b) Short Question  | 07 marks |
| (Based On Unit III & IV)   |          |
| Q3. Write short notes on any two of the following (Each of 05 Marks) | 10 marks |
| a)   |          |
| b)   |          |
| c)   |          |
| d)   |          |
| (Based on all Units)   |          |

*Ganesh C*  
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SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

**BOTANY – CURRICULUM**

**B.Sc. General (CBCS Pattern)**

**Skeleton Question Paper**

**B. Sc. First Year**

**Annual Pattern**

**PRACTICAL PAPER-V: BASED ON THEORY PAPER-I, II, III & IV**

**(Compulsory)**

**Time: Four hours**

**Maximum Marks: 80**

- Note: -**
- (i) Attempt all questions
  - (ii) Show your preparations to the examiner
  - (iii) Draw neat and well labeled diagrams wherever necessary

Q1. Identify, classify and describe the given specimen –**A** (Two Algae from Mixture / Fungi) on the basis of external and internal characters.

(The specimen **A** may be given alternately to the students) 15 Marks

Q2. Identify, classify and describe the given specimen –**B** ( Bryophyta / Pteridophyta/ Gymnosperms ) on the basis of external and internal characters.

(The specimen **B** may be given alternately to the students) 15 Marks

Q3. Make a temporary preparation of the given specimen **C**. Identify and describe its internal structure of ecological interest. (Hydrilla stem/ *Nymphaea* petiole/ *Casuarina* stem / *Nerium* leaf. (Specimen **C** may be given alternately to the students) 15 Marks

Q4. Describe, Identify and classify the given plant specimen **D** with floral formula and floral diagram (flowering twig of easily available plant for specimen **D** may be given alternately to the students)

15 Marks

Q.5 Spotting (Identify and describe the spots-**A, B, C, D** and **E** as per the given instructions)

( A- Algae / Fungi, B- Bryophyta/Pteridophyta/Gymnosperms/Fossil Specimen, C- Ecology , D& E – Taxonomy/ morphology of families of flowering plants .)

10Marks

Q.6. Visit/ Excursion reports

05 Marks

Q.7. Viva- Voce

05 Marks

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