Rayat Shikshan Sanstha's

SADGURU GADGE MAHARAJ COLLEGE, KARAD

(An Autonomous College - Affiliated to Shivaji University, Kolhapur)

Accredited By NAAC with A^+ Grade (CGPA 3.63)

National Education Policy (NEP-2.0)

Syllabus for

B.Sc. Part -II

Botany

(Minor)

Syllabus to be implemented from June 2024 onwards of

Academic Year 2024-25

Rayat Shikshan Sanstha's

Sadguru Gadage Maharaj College, Karad (Autonomous)

Syllabus for Bachelor of Science (B.Sc.) Part – II

1. TITLE:**Botany**

2. YEAR OF IMPLEMENTATION:**2024 – 2025**

3. PREAMBLE:

4. The B. Sc. Botany course under autonomy has been prepared keeping in view the unique requirements of B. Sc. Botany students. The contents have been drawn up to accommodate the widening horizons of the discipline of biological sciences. The emphasis is to provide students the latest information along with due weightage to the concepts of classical botany so that they are able to understand and appreciate the current interdisciplinary approaches in the study of plant sciences and its role in societal development. The course content also lists new practical exercises so the students get hands on experience of the latest techniques that are currently in use. The course will also inspire students to pursue higher studies in botany, for becoming an entrepreneur and enable students to get employed in plant-based industries.

5. GENERAL OBJECTIVES OF THE COURSE:

- To impart the knowledge of science is the basic objective of education.
- To develop scientific attitude among the students and to make the students open minded, critical and curious.
- To develop skill in practical work, experiments and laboratory materials.
- To understand scientific terms, concepts, facts, phenomenon and their relationships.
- To make the students aware of natural resource and environment.

- To enable the students to acquire knowledge of plants and related subjects so as to understand nature and environment in the benefit of human beings.
- To develop ability for the application of acquired knowledge to improve agriculture and related fields to make the country self-reliant.

6. DURATION: **01 year**

7. PATTERN:**NEP**

8. MEDIUM OF INSTRUCTION: **English**

9. STRUCTURE OFCOURSE:

1) THIRD SEMESTER (NO.OFPAPERS–01)

Sr. No.	Subject Title	Paper No. & Paper Code	Title of Paper	No. of lectures per week	Credits
1.	**Botany**	**Paper-V MN- BBT 23-301**	**Plant Ecology and Plant Physiology**	**02**	**02**
2.	**Botany**	**Practical – III MN-BBP23-301**	**Practical III**	**08**	**02**

2) FOURTH SEMESTER (NO.OFPAPERS–01)

Sr. No.	Subject Title	Paper No. & Paper Code	Title of Paper	No. of lectures per week	Credits
1.	**Botany**	**Paper-VI MN- BBT 23-401**	**Economic Botany and Herbal Technology**	**02**	**02**
2.	**Botany**	**Practical-IV MN- BBP 23-401**	**Practical IV**	**08**	**02**

3) Structure and titles of papers of B.Sc. Course

B.Sc.II Semester III
Paper V: Plant Ecology and Plant physiology
Botany Practical III: Practicals based on Theory Paper V

B.Sc. II Semester IV
Paper VI : Economic Botany and Herbal technology
Botany Practical IV: Practicals based on Theory Paper VI

4) Other Features:

A) LIBRARY:

Reference books, Text books, Journals, Periodicals available in Institute and Departmental Library. (Separate reference lists are attached along with the respective course syllabus)

B) SPECIFIC EQUIPMENTS:

a) Computer, LCD projector, Visualizer,SmartBoard

b) Laboratory Equipment's:

1. Microscope with digital camera
2. Digital weighing balance
3. pH meter
4. Spectrophotometer
5. Cooling centrifuge
6. Laminar air flow
7. Microtome
8. Autoclave
9. HotAir Oven
10. Incubator
11. Refrigerator
12. Stereo zoom microscope
13. Dissecting microscope

5) Evaluation Structure for B.Sc. II Botany

Sem	Paper Code	Credits	Title of Paper	Evaluation Scheme (Marks)			Grand Total
				CCE	SEE	**Total**	
III	MN-BBT23-301	02	**Plant Ecology and Plant Physiology**	10	40	**50**	**100**
	MN-BBP23-301	02	**Botany Practical III**	-	-	**50**	
IV	MN-BBT23-401	02	**Economic Botany and Herbal Technology**	10	40	**50**	**100**
	MN-BBP23-401	02	**Botany Practical IV**	-	-	**50**	
Total		**08**				**200**	**200**

Evaluation Pattern for Practical (Semester wise)

Sem.	Practical Code	Credits	Title of Practical	Evaluation Scheme (Marks)			Total
				Practical Exam	Journal	Student Performance /Project/Tour Report	
III	MN-BBP23-301	02	**Practical III**	40	05	05	**50**
IV	MN-BBP23-401	02	**Practical IV**	40	05	05	**50**
Total		**04**					**100**

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Bachelor of Science (B.Sc.) Part–II: Botany

Semester III

Theory Paper V: MN-BBT23-301

Plant Ecology and Plant Physiology (Credit 02)

Learning Objectives:

i. To make students aware about the concepts of ecology & advanced environmental science.
ii. To understand the inter-relationships between the living and non- living world.
iii. To impart the basic knowledge of photosynthesis.
iv. To impart the basic knowledge of processes involved in Seed germination and seed dormancy.

Total Lectures: 30

Unit I Plant Ecology and Adaptation **07**

Introduction, Definition and Scope of ecology.

Ecological factors- Edaphic factors (Soil) - Definition, Composition and soil profile.

Climatic factors- Light and Temperature.

Plant Adaptation- Ecological adaptation in Hydrophytes and Xerophytes.

Unit II Plant Community and Ecosystem **08**

Plant community- Introduction, General characters, Forms and structure. Raunkier's life forms.

Plant Succession- Characters, Process and Types (Hydrosere and Xerosere).

Ecosystem-Introduction, components (abiotic and biotic), Types of Ecosystem, Food chain and food web, Ecological pyramids.

Unit III Photosynthesis **08**

Introduction, structure of chloroplast, photosynthetic pigments (Chlorophylls, Carotenoids and Phycobilins)

Mechanism of photosynthesis : a) Light reaction – Photolysis of water, Photosystem I and II, Photophosphorylation - Cyclic and Non-cyclic;

b) Dark reaction: C_3, C_4 and CAM pathway. Significance of photosynthesis, Photorespiration.

Unit IV Seed Dormancy and Germination **07**

Concept of dormancy causes of dormancy, Methods of breaking of seed dormancy.

Seed germination- Introduction and types (Epigeal, Hypogeal and Viviparous), Factors affecting seed germination, Biochemical changes during seed germination.

Learning outcomes:
Students will be able to:

i. Explains the basic terms and issues in the field of ecology and environmental protection.
ii. Describes the relations and interactions between biotic and abiotic components of the environment.
iii. Understand the role of enzymes in plant physiology.
iv. Explain the concepts of seed dormancy and germination in plants.

References:

1. R. S. Ambasht, A Textbook of Plant Ecology (India: CBS Publishers and Distributors, 2017)
2. S. K. Agarwal, Fundamentals of Ecology (New Delhi: APH Publishing Corporation, 2008) E. J. Kormondy, Concepts of Ecology (New Jersey: Prentice Hall Publishing Company, 1996).
3. K. C. Misra, Manual of Plant Ecology (New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd., 1991)
4. VermaV. Text Book of Plant Physiology. Emkay Publications., B-19, East Krishna Nagar, Delhi-1100051. (Unit II)
5. Bidwell, R.G.S.1974.Plant Physiology. Macmillan Pub.Co.,N.Y.(Unit III)
6. Hopkins, W.G.1995.Introduction to Plant Physiology. John Wiley & Sons, Inc., New York, USA. (Unit III)
7. Pandey, S.N. (1991): Plant Physiology, Vikas Publishing House (P) Ltd., New Delhi, India. (Unit IV)

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Bachelor of Science (B.Sc.) Part–II: Botany

Semester III

Practical III: MN BBP 23-301 (Based on Theory Paper V)

Sr. No.	Name of the Experiment
1	Study of morphological and anatomical adaptations in hydrophytes. (*Hydrilla, Eichhornia*)
2	Study of morphological and anatomical adaptations in xerophytes. (*Nerium, Aloe*)
3	Study of morphological and anatomical adaptations in epiphyte (Orchid) and parasite (*Cuscuta*).
4	Study of pH and Water holding capacity of soil.
5	Study of Ecological pyramids- Number, Biomass and Energy with suitable example.
6	Study of Kranz anatomy in C_4 plants.
7	Study of oxygen evolution during photosynthesis.
8	Study of separation of photosynthetic pigments by using paper chromatography.
9	Estimation of Chlorophylls by using colorimeter/ spectrophotometer.
10	Estimation of TAN value in CAM plants.
11	Study of breaking seed dormancy by mechanical and chemical scarification.

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Bachelor of Science (B.Sc.) Part–II: Botany

Semester IV
Theory Paper VI : MN-BBT23-401
Economic Botany and Herbal Technology (Credit 02)

Learning Objectives:

i. To impart the knowledge of diverse human uses of plants and plant products.
ii. To impart the knowledge of taxonomic diversity of useful plants.
iii. To impart the knowledge of biological reasons why certain plant resources are important.
iv. To impart the knowledge of increased awareness and appreciation of plants and plant products encountered in everyday life.

Total Lectures: 30

Unit I Cereals, Legumes and Oils **08**

Origin of Cultivated Plants: Concept of centers of origin, their importance with reference to Vavilov's work.

Cereals: Origin, Botanical Name, Morphology, Plant Parts used and Economic importance of Wheat, Jowar.

Legumes: Origin, Botanical Name, Morphology, Plant Parts used and Economic importance of Gram, Chickpeas.

Oils and Fats: Origin, Botanical Name, Morphology, Plant Parts used and Economic importance of Ground nut and Sunflower.

Unit II Spices, Beverages and Fibers **07**

Spices and Condiments: Origin, Botanical Name, Morphology, Parts used and Uses of Clove and Black pepper.

Beverages: Origin, Botanical Name, Morphology, Parts used and uses of Tea and Coffee.

Fiber yielding Plants: Origin, Botanical Name, Morphology, Parts used and uses of Cotton and Bamboo.

Unit III Pharmacognocy **07**

Plant morphology, biological source, chemical constituents and medicinal uses of the following herbs: Periwinkle (*Catharanthus roseus)*, Gulvel (*Tinospora cordifolia*), Brahmi (*Bacopa monnieri)*, Turmeric (*Curcuma longa*), Sarpagandha (*Rauvolfia serpentina*).

Unit IV Herbal Cosmetics **08**

Herbal plants used in cosmetic formulations for skin care (cream, lotion and sunscreen), hair care (oil, shampoo, conditioner and dye) and oral care (toothpaste and mouthwash.

Learning outcomes:

Students will be able to:

i. Explain the uses of economically important plants and illustrate the processing of various plant parts.
ii. Analyze the utilization of various plant resources in day-to-day life.
iii. Understand raw material as source of herbal drugs from cultivation to herbal drug product.
iv. Know the herbal cosmetics.

References:

1. Agner, H.H., &Hikino, &Farns worth, N: Economic & Medicinal plant research, Vol.1- 3, (Academic Press)
2. Pandey, B.P. (1992). Economic Botany. (S. Chand and Sons Co., New Delhi).
3. Verma, (1998). Text book of Economic Botany, Embay Publishers, New Delhi.
4. Textbook of Pharmacognosy by Trease & Evans.
5. Textbook of Pharmacognosy by Tyler, Brady & Robber.
6. Essential of Pharmacognosy by Dr.S.H. Ansari
7. Pharmacognosy &Phytochemistry by V.D. Rangari
8. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy).

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Semester IV

Practical IV: MN BBP 23-401 (Based on Theory Paper VI)

Sr. No.	Name of the Experiment
1	Study of Botanical Name. Morphology, Parts used and Economic importance of Wheat and Jowar.
2	Study of Botanical Name. Morphology, Parts used and Economic importance of Gram and Chickpea.
3	Study of Botanical Name. Morphology, Parts used and Economic importance of Clove and Black pepper.
4	Study of Botanical Name. Morphology, Parts used and Economic importance of Ground nut and Sunflower.
5	Study of Botanical Name. Morphology, Parts used and Economic importance of Cotton, Bamboo.
6	Herbal preparations of: Hair oil (Maka), Shampoo (Ritha, Shikakai).
7	Biochemical tests for drug adulteration of Haladi (*Curcuma longa*), Hing (*Ferula asafoetida),* and Camphor (*Cinnamommum camphora*).
8	Phytochemical analysis – Qualitative tests for Alkaloids, Saponin, Steroids, Terpenoids, and Flavonoids.
9	Separation of alkaloids by using paper chromatography.
10	Macroscopic study of plants.
11	Visit to medicinal plant garden/ study tour.

Nature of Theory Question Paper

B. Sc. Part II Paper V&VI

Total Marks – 40

Q.1 Choose the correct alternative from the following. **8 marks**

i) to viii) MCQ one mark each with four options.

a) b) c) d)

Q.2 Attempt any TWO of the following. **16 marks**

A)

B)

C)

Q.3 Attempt any FOUR of the following. **16 marks**

a)

b)

c)

d)

e)

f)

Nature of Practical Question Paper

B. Sc. Part II Practical III & IV

Total Marks: 50

Q.1 Demonstrate the specimens 'A' and 'B'	**16 marks**
Q.2 Comment on the specimens 'C'	**08 marks**
Q.3 Identify and Describe	**16 marks**
D)	
E)	
F)	
G)	
Q. 4 Journal	**05 marks**
Q. 5 Student performance/ project/ tour report	**05 marks**