Rayat Shikshan Sanstha's

SADGURU GADAGE MAHARAJ COLLEGE, KARAD.

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

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

National Education Policy (NEP-2020)

Syllabus for

B.Sc. Part -I

BOTANY

(Minor)

Syllabus to be implemented from July 2023 onwards of

Academic Year 2023-24

Department of Botany

Syllabus for B.Sc.-I BOTANY (Minor)

B. Sc. Part-I, Semester-I

Paper- I (MN-BBT23-101): Diversity of Cryptogams (Credits: 02)

w.e.f. July-2023

Learning Objectives: Students will be able to-

1. State basic knowledge of different plant groups.
2. Generalize knowledge, importance and biodiversity of lower plant groups.
3. Illustrate the knowledge of economic importance of lower plant groups.
4. Apply the knowledge of opportunities for a career in the uses of lower plant groups.

Unit I : Introduction to Plant Kingdom and Bacteria **08**

Systems of classification (Two, Three and Five kingdom systems), General outline of plant kingdom.

Bacteria: Discovery, General characters, Cell structure and Types

Modes of reproduction – Vegetative, Asexual, Sexual –

Conjugation. Economic Importance.

Unit II : Algae **08**

General Characters of Algae.

Classification System of Algae (by G. M. Smith)

Economic Importance of Algae

Morphology and life cycles (excluding developmental stages) of *Nostoc* and *Spirogyra*

Unit III : Fungi **08**

General Characters of Fungi

Classification System of Fungi (by G. C. Ainsworth)

Economic Importance of Fungi

Morphology and life cycle (excluding developmental stages) of *Mucor* and *Penicillium*

Unit IV : Lichens **06**

General characters of Lichens

Types of Lichens based on thallus morphology

Methods of reproduction

Economic Importance of Lichens

Reference books-

1. Ainsworth GC and AS Sussman, The Fungi Vols. I, II, III, IV- A and IV-B (Unit III)
2. Alexopoulus CJ (1960) Introductory Mycology (Unit III)
3. Awasthi DD (2000) A handbook of Lichens (Unit IV)
4. Dube HC (1990) An Introduction to Fungi, Vikas Publishing House Pvt. Ltd., Delhi (Unit III, IV)
5. Kumar HD (1990) Introductory Phycology. East Western Press. New Delhi (Unit II)
6. Sharma OP(1992) Textbook of Thallophytes. McGraw Hill Pub. Co. (Unit II)
7. Sharma OO (1989)Textbook of Fungi (Unit III)
8. Gangulee HS and Kar AK (1992) College Botany Vol. II, New Central Book Agency (P) Ltd. (Unit I, III, IV)
9. Sharma PD (1991) The Fungi. Rastogi and Company, Meerut. (Unit III)
10. VashisthaBR and Sinha AK, Botany for degree students – fungi (Unit III)
11. Vashishtha BR (1976) Botany for Degree Students Part I Algae. S. Chand and Company, New Delhi. (Unit II)
12. Smith GM (1971) Cryptogamic Botany. Vol. I Algae and Fungi. Tata McGraw Hill Publishing Co. New Delhi. (Unit II)

Learning Outcomes:

After successful completion of the course, Student will be able to:

1. Apply the features and uses of lower cryptogams.
2. Implement the knowledge of lower cryptogams.
3. Give knowledge about the plant diversity of lower cryptogams.
4. Use to know the career opportunities in academics, research and entrepreneurship with respect to lower cryptogams.

Department of Botany

Syllabus for B.Sc.-I BOTANY (Minor)

B. Sc. Part-I, Semester-I

Paper- II (MN-BBT23-102): Plant Morphology (Credits: 02)

w.e.f. July-2023

Learning Objectives: Students will be able to-

1. Generalize the knowledge of diversityin vegetative and reproductive parts of plants.
2. Applythe basic knowledge of plant identification.
3. Interpretbasic knowledge of plant morphology.
4. Explain the knowledge of morphology and reproductive plant parts.

Unit I : Morphology of Vegetative Parts **7**

Root Morphology: Types of root- Tap root and adventitious roots; modifications for storage.

Stem Morphology: Shape, surface and nature of branching (monopodial and sympodial), modification of stem (Runner, Rhizome, Tuber and Bulb).

Leaf: Typical leaf, Types (simple and compound), Types of phyllotaxy, venation and modification of leaf (Tendril and phyllode).

Unit II : Inflorescence **8**

Inflorescence: Definition.

Racemose -Raceme, Spike, Spadix, Corymb, Umbel, Catkin and Capitulum.

Cymose -Solitary, Monochasial- Helicoid and scorpiod; Dichasial and Polychasial.

Special types -Verticillaster, Cyathium and Hypanthodium. Significance of inflorescence.

Unit III : Flower **8**

Definition, Structure of typical flower, Types of Thalamus.

Calyx and corolla- types of corolla, cohesion and aestivation; Perianth.

Androecium: Structure of typical stamen, Variations- cohesion and adhesion.

Gynoecium: Structure of typical carpel, number, position, cohesion and adhesion; placentation- types and significance.

Unit IV : Fruits **7**

Introduction, Parts of fruit, Classification of fruits: a) Simple: Indehiscent, Dehiscent and Fleshy, b) Aggregate: Etaerio of Berries and Etaerio of Follicles. c) Multiple/ Composite fruits: Syconus and Sorosis.

Reference books-

1. Gurucharan Singh (2009) Plant systematics an integrated approach (Third edition), Science publisher.
2. Dutta A. C. (1964) Botany for degree students, Oxford University press, Bombay, Culcutta, Madras.
3. Gurucharan Singh: Plant Systematics (2004) An Integrated Approach, Science Publishers.
4. Annie Ragland, V. Kumaresan: Taxonomy of Angiosperms, Saras Publication (ISBN : 9789382459668)
5. George H. M. Lawrence (1955) An introduction to plant taxonomy, central book depot, Allhabad.
6. Pandey B.P. (2001) Taxonomy of Angiosperms, S. Chand Publishing,.
7. Kumar A.: Advanced Morphology of Angiosperm.
8. Vasistha P. C. Taxonomy of Angiosperms.
9. Sachdeva S.K. (1990) Angiosperms – Morphology, Anatomy, Taxonomy, Evolution, Kalyani Publication, Ludhiana.
10. Pandey S.N. Mishra S.P. (2009) Taxonomy of Angiosperms, Ane Books Pvt. Ltd., New Delhi.
11. Singh M.P. and Sharma A.K. (2002) Textbook of Botany, Anmol Publication, Pvt. Ltd., New Delhi.

Learning Outcomes:

After successful completion of the course, Student will be able to:

1. Apply the knowledge about vegetative and reproductive parts of plants.
2. Implement the knowledge of plant identification.
3. Execute the knowledge in finding range of variations found in different species of plants.
4. Distinguish structure of typical flower, inflorescence and fruits.

Department of Botany

Syllabus for B.Sc.-I BOTANY (Minor)

B. Sc. Part-I, Semester-I,

Practical (MN-BBP23-103)

Based on theory paper I (Diversity of Cryptogams) and II (Plant Morphology) (Credits: 02)

w.e.f. July-2023

Learning Objectives: Students will be able to-

1. Define the lower plant groups.
2. Distinguish modification of root and stem.
3. Differentiate the various types of leaf and inflorescence and also variation in thalamus.
4. Generalize structure of typical flower.
5. Identify different types of fruits.

1.	Study of forms of bacteria based on their shape (Permanent slide/ Photograph).
2 and 3.	Study of life cycle of *Nostoc* and *Spirogyra*.
4 and 5.	Study of life cycle of *Mucor* and *Penicillium*.
6.	Study of Types of lichens (Based on morphology).
7.	Study of different root modification.
8.	Study of nature of branching, modification of stem.
9 and 10.	Study of leaf: Types (simple and compound), phyllotaxy, venation and modification.
11 and 12.	Inflorescence: Racemose, Cymose and special type.
13.	Structure of typical flower and variation in Thalamus.
14 and 15.	Study of different types of fruit.

Learning Outcomes:

After successful completion of the course, Student will be able to:

1. Differentiate the lower and higher plant groups.
2. Identify the variation in plants.
3. Recognize the types of lichens.
4. Relate the modification of root and stem.
5. Compare types of leaf, inflorescence and fruits.

Department of Botany

Syllabus for B.Sc.-I BOTANY (Minor)

B. Sc. Part-I, Semester-II

Paper- III (MN-BBT23-201): Diversity of Archegoniate (Credits: 02)

w.e.f. July-2023

Learning Objectives: Students will be able to-

1. State basic knowledge of different plant groups.
2. Generalize knowledge, importance and biodiversity of vascular and non-vascular plant groups.
3. Illustrate the knowledge of economic importance of vascular and non-vascular plant groups.
4. Apply the knowledge of opportunities for a career in the uses of vascular and non-vascular plant groups.

Unit I	**:**	**Bryophytes** General characters, Alteration of Generation, Economic importance, Morphology, Anatomy and Life cycle (excluding developmental stages) of *Riccia* and *Funaria*.	**7**
Unit II	**:**	**Pteridophytes** General characters, Economic importance, Morphology, Anatomy and Life cycles (excluding developmental stages) of Lycopsida – *Selaginella*, Pteropsida – *Pteris*; Heterospory and seed habit.	**8**
Unit III	**:**	**Gymnosperms** General characters, Classification (up to order), Economic importance, Morphology, Anatomy (Leaf and Stem) and life cycle (excluding developmental stages) of Gnetopsida – *Gnetum*.	**7**
Unit IV	**:**	**Introductory Taxonomy** Introduction, Scope of Taxonomy, Functions of taxonomy: Classification, Identification, Nomenclature, Binomial Nomenclature; Ranks, Categories and taxonomic groups.	**8**

Reference books-

1. Parihar N. S. (1962) Bryophyta. Central Book Depot, Allahabad (Unit I)
2. Kashyap S. R. (1929) Liverworts of Western Himalayas and the Punjab Plains Part Iand II (Unit I)
3. Jermy A. G. (1973) The Phylogeny and Classification of ferns. (Unit II)
   Parihar N. S. (1959) An Introduction to Pteridophyta (Unit II)
4. Bierhorst D. W. (1971) Morphology of Vascular plants (Unit II, III)

5. Chamberlein C. J. (1966) Gymnosperms, Structure and Evolution (Unit III)
6. Coulter and Chamberlein J. M., Morphology of Gymnosperms (Unit III)
7. Bhatnagar S. P. and Moitra A (1996) The Gymnosperms. (Unit III)
8. Foster A. S. and Gifford E. M. (1959) Comparative morphology of vascular plants (Unit III)
9. Rashid A (1978) An introduction to Peridophytes (Unit II)
10. Ramanujan CGK (1979) Indian Gymnosperms in Time and Space (Unit III)
11. Smith GM (1971) Cryptogamic Botany. Vol. II Tata McGraw Hill Publishing Co. New Delhi. (Unit I)
13. Spome KR (1966) Morphology of Pteridophytes (Unit II)
14. Sporne KR (1967) Morphology of Gymnosperms (Unit III)
15. Surange KR (1968) Indian Fossil Pteridophyles (Unit IV)
16. Trivedi AN (2002) Advances in Pteridology (Unit II)
17. Vashishta BR (1996) Botany for degree students – Pteridophytes (Unit II)
18. Vashistha PC (1976) The Gymnosperms (Unit III)
19. Watson EV (1971) The structure and life of Bryophytes. Hutchinson and Co., London (Unit I)

Learning Outcomes:

After successful completion of the course, Student will be able to:

1. Apply the knowledge of features and uses of vascular and non-vascular plants.
2. Describe the concepts regarding vascular plants and non-vascular plants.
3. Interpret knowledge about plant diversity of vascular and non-vascular plants.
4. Express terminologies about taxonomy.

Department of Botany

Syllabus for B.Sc.-I BOTANY (Minor)

B. Sc. Part-I, Semester-II

Paper- IV (MN-BBT23-202): Plant Resources and Pharmaceutical Industry (Credits: 02)

w.e.f. July-2023

Learning Objectives: Students will be able to:

1. Impart the knowledge plant role in human welfare.
2. Make aware of the industrial applications of plant resources.
3. Update about plant dependent industries.
4. Encourage and think about entrepreneurship and start-ups.

Unit I : Plant Resources **08**

Introduction, concept, natural resources, biological resources, plants as natural resources, underutilized plants from Western Ghats

Utilization - Bioenergy, food, fodder, fibre, medicine and essences.

Plant Resources Processed – Jam, jelly, squash, ketchup, raisin, pickle and rubber Unprocessed – Honey, timber, wood, and tannins

Unit II : Flower arrangement **07**

Introduction, principles and basic elements of art in flower arrangement

Flowers and foliages suitable for flower arrangement

Types – social, formal and non-formal, materials used flower arrangement as a business

Unit III : Plant resources used in cosmetics, aromatics and pharmaceuticals **07**

Introduction, Scope of Herbal preparations.

Methods of extraction – Maceration, digestion, decoction, aromatic waste, extracts and tinctures i) *Aloe* ii) Henna iii) Lemon grass iv) Rose v) Jasmine vi) Turmeric vii) Ginger viii) Neem ix) Holy basil x) Kuda xi) Amala with reference to part used, products and uses

Unit IV : Plant Pharmaceutical Industry **08**

Concept and advantages

Types of pharmaceutical products: Churna, Asava, and Arishta, Drug plants with reference to the botanical source, active principles and medicinal uses of *Adathoda zeylanica*, *Tinospora cordifolia*, and *Asparagus racemosus.*

Manufacture of Churna (Triphalachurna), Arishta (Ashokarishta), and Asava (Kumariasava).

Concept of nutraceuticals and cosmeceuticals

Commercial significance of Amla and *Aloe*

Reference books-

1. A Textbook of Economic Botany. Sambamurthy, A.V.S.S., Subramanyam, N.S., Wiley Eastern Ltd., New Delhi. (1989)
2. Ayurvedic Useful Plants in India. Drury, C. H. Asiatic Publishing House, New Delhi. (2006).
3. Economic Botany - Plants in Our World. Simpson, B.B., Conner-Ogorzaly, M., McGraw Hill, New York. (1986)
4. Economic Botany in Tropics. Kocchar, S.L., 4th Edition. Macmillan India Ltd., New Delhi. (2011)
5. Indian MateriaMedica Vol. I and II. Nadkarni, K. M. Popular Prakashan, Mumbai. (2002)
6. Banker G S and Rhode C T Modem Pharmaceutics, Marcel Dekker Inc., NY.
7. Bean H S, Beckett A H, and Carless A H Advances in Pharmaceutical Sciences, Vol 1-4 Academic Press, London.
8. Cartstensen J T, Drug Stability, Marcel Dekker Inc NY.
9. Thakur, R.S., Puri, H.S. and Husain, A. (1969). Major medicinal plants of India, Central Institute of medicinal and aromatic plants, Lucknow.
10. Sharma, O.P. (1996). Hills Economic Botany, Tata McGraw Hill co., Ltd., New Delhi
11. Kocchar, S.L. (1998). Economic Botany of the tropics, II Edn. MacMillan India Ltd.

Learning Outcomes:

After successful completion of the course, Student will be able to:

1. Analyze the role of plants in human welfare.
2. Know the industrial applications of plant resources.
3. Recognize the plant dependent industries.
4. Discuss ideas related to plant based entrepreneurship and start-ups.

Department of Botany

Syllabus for B.Sc.-I BOTANY (Minor)

B. Sc. Part-I, Semester-I,
Practical (MN-BBP23-203)
Based on theory paper III (Diversity of Archegoniate) and IV (Plant Resources and Pharmaceutical Industry) (Credits: 02)
w.e.f. July-2023

Learning Objectives: Students will be able to-

1. Define practical knowledge about archegoniate plant.
2. Participate in experiential learning with these practical.
3. Categorize underutilized plants of Western Ghats.
4. Generalize the plant resources and utilization of plants.
5. Understand the preparation of medicinal, aromatic and cosmetic remedies.

1.	Study of life cycle of *Riccia* and *Funaria.*
2.	Study of life cycle of *Selaginella* and *Pteris*.
3.	Study of life cycle of *Gnetum*.
4.	Underutilized plants from Western Ghats (Checklist)
5 and 6.	Preparation of Jam, squash, ketchup
7.	Plant resources-timber, wood and tannins yielding plant
8 and 9.	Flower arrangement
10 and 11.	Maceration, digestion and decoction techniques in pharmaceuticals.
12.	Medicinal plants: *Adathoda zeylanica, Tinospora cordifolia,* and *Asparagus racemosus*
13.	Preparation of Triphalachurna
14.	Preparation of Ashokarishta
15.	Preparation of Kumariasava

Learning Outcomes:

After successful completion of the course, Student will be able to:

1. Identify the variation in plants.
2. apply the practical knowledge regarding timber, wood and tannins yielding plant, as well as maceration, digestion and decoction techniques in pharmaceuticals
3. Prepare Jam Jelly and Ketchup.
4. Formulate the Ayurvedic preparations.
5. Self-entrepreneur

Department of Botany
Nature of SEE Question Papers
(w.e.f.July2023)

Que. 1. Select correct alternative. 08

1. .....

a) ..... **b)** .....

c) ..... **d)** .....

2. .....

a) ..... **b)** .....

c) ..... **d)** .....

3. .....

a) ..... **a)** .....

c) ..... **c)** .....

4. .....

a) ..... **a)** .....

c) ..... **c)** .....

5. .....

a) ..... **a)** .....

c) ..... **c)** .....

6. .....

a) ..... **b)** .....

c) ..... **d)** .....

7. .....

a) ..... **b)** .....

c) ..... **d)** .....

8. .....

a) ..... **b)** .....

c) ..... **d)** .....

Que. 2. Attempt any two. 16

A) .....

B) .....

C) .....

Que. 3. Attempt any four. 16

a) .....

b) .....

c) .....

d) .....

e) .....

f) .....

Department of Botany
For academic year: 2023-24

List of Paper setters

Sr. No.	Name of Paper setter	College
1	Dr. V. K. Nikam	S.G.M. College, Karad
2	Dr. (Mrs.) M. S. Patil	S.G.M. College, Karad
3	Dr. K. H. Patil	S.G.M. College, Karad
4	Dr. V. B. Chopade	S.G.M. College, Karad
5	Dr. A. V. Waghmode	S.G.M. College, Karad
6	Prof. Dr. D. D. Namdas	YCIS Satara
7	Dr. J. J. Chavan	YCIS Satara
8	Dr. S. D. Shaikh	RCSC Kolhapur
9	Dr. Mrs. R. A. Shinde	YCIS Satara
10	Dr. N. M. Pise	K. B. P. College, Pandharpur

Department of Botany
For academic year: 2023-24

List of Examiners

Sr. No.	Name of Examiners	College
1	Prof. Dr. D. D. Namdas	YCIS Satara
2	Dr. J. J. Chavan	YCIS Satara
3	Dr. S. D. Shaikh	RCSC Kolhapur
4	Dr. Mrs. R. A. Shinde	YCIS Satara
5	Dr. N. M. Pise	K. B. P. College, Pandharpur
6	Dr. H. S. Patil	Arts, Science and Commerce College, Baramati
7	Dr. S. R. Valvi	NowrosjeeWadia College, Pune
8	Dr. U. R. Pawar	ShriPanchamKhemrajMahavidyalalaya, Sawantwadi
9	Dr. U. H. Patil	BhogavatiMahavidylaya, Kurukali
10	Dr. S. K. Mengane	M. H. ShindeMahavidyalaya, Tisangi

Department of Botany
For academic year: 2023-24

List of Moderators

Sr. No.	Name of Moderators	College
1	Prof. Dr. D. D. Namdas	YCIS Satara
2	Dr. J. J. Chavan	YCIS Satara
3	Dr. S. D. Shaikh	RCSC Kolhapur
4	Dr. N. M. Pise	K. B. P. College, Pandharpur
5	Dr. H. S. Patil	Arts, Science and Commerce College, Baramati