

Education for Knowledge, Science and Culture.”

– Shikshanmaharshi Dr. Bapuji Salunkhe

VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR.

B.Sc. Part I CBCS syllabus with effect from June , 2021

Title of Papers

Subject: Botany Class: B.Sc- I

Semester	Paper No.	Title
I	I (DSC 1007 A)	“ Biodiversity in Microbes, Algae and Fungi ”
	II (DSC1007 B)	“ Bryophytes, Pteridophytes and Gymnosperms (Archegonites) ”
II	III (DSC 1007 C)	“ Plant Ecology ”
	IV (DSC 1007 D)	“ Angiosperm Taxonomy ”

Programme Outcomes of B.Sc. Botany

1. Students will acquire comprehensive knowledge about microbes and their role in environment.
2. Students will develop comprehensive knowledge about algae, fungi and lichen and their significance.
3. Students will get comprehensive knowledge about bryophytes, pteridophytes and their utilization.
4. Students will develop comprehensive knowledge about gymnosperms and their evolutionary significance.
5. Students will develop comprehensive about plant environment, adaptations and ecological interactions in plants.
6. Students will get comprehensive knowledge about ecosystem its functioning and phytogeography of India.
7. Students will get comprehensive knowledge about angiosperm morphology and taxonomy.
8. Students will get comprehensive knowledge about plant families and their economic importance.
9. Accurately interpretation of collected information and use taxonomical information to evaluate and formulate a position of plant in taxonomy.
10. Students will be able to demonstrate proficiency in the experimental techniques and methods of analysis appropriate for their area of specialization within biology.

Students will develop knowledge about management, problem analysis, ethics and communication.

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B.Sc. Part I CBCS syllabus with effect from June ,2021

Semester: I Botany - Paper I

BOTANY- DSC 1007 A

“ Biodiversity in Microbes, Algae and Fungi ”

Theory: 30 Hours Credits: 2

- **Course outcomes :**

1. Candidates trained will be able to identify and classify bacteria, fungal, algal and lichen live and preserved specimen.
2. Candidates' trained will be able to understand classification of fungal, algal and lichen.
3. Candidates trained will be able to identify diatoms.
4. Candidates trained will be able to identify VAM fungi.

- **Syllabus**

Unit.1. Microbes: (08 hrs)

1a: Virus: Discovery, General Characters, DNA virus (T Phage) and RNA virus (TMV), Economic importance.

1b. Bacteria- Discovery, General Characters, Cell structure, Types, Mode of reproduction - **Binary fission , Budding , Conjugation ,Transformation & Transduction** Economic importance.

Unit.2: Algae and Fungi: (10 hrs)

2a. Algae: General Characters, Classification (As per G. M. Smith) up to class with characters and suitable example. Economic importance.

A. Morphology and Life Cycle (Excluding developmental stages) of

1. Cyanophyceae- *Nostoc*
2. Chlorophyceae- *Spirogyra*

B.1.**Diatoms**

2. Algal biofertilizers and its importance

2b. Fungi:

(09 hrs)

General Characters, Classification (As per Ainsworth) up to class with characters and suitable example. Economic importance,

A. Morphology and Life Cycles (Excluding developmental stages) of

1. Zygomycotina- *Mucor*

2. Ascomycotina –*Penicillium*

B. VAM fungi & its importance

2c. Lichen: Definition, structure of thallus, types, reproduction & economic importance.

(03 hrs)

Reference Books :**Algae –**

1. Introductory Phycology. H. D. Kumar, 1988, Affiliated East-West Press Ltd., New York.
2. Algae - H. D. Kumar and H. N. Singh (1991)
3. Algae - O. P. Sharma (1986)
4. Algae - B. P. Pandey (1994)
5. A Text book of Algae - G. L. Chopra (1969)
6. A Text book of Algae - H. D. Kumar and H. N. Singh (1977)
7. A Text book of Botany - V. Singh, P. C. Pandey, D. K. Jain (1999)
8. A Text book of Botany Vol. I – S. N. Pandey, S. P. Misra and P. S. Trivedi (1.982)
9. A Treatise on Algae - K. N. Bhatia (1980)

Fungi –

1. A Hand book of Lichens - D. D. Awasthi (2000)
2. An Introduction to Fungi - H. C. Dube (1990)
3. Morphology of Plants and Fungi -- H.C. Blod, Aloxopoulos, G. J. and Delevoryas, T. 1980. (4th Edition) Harper and Foul Co., New York.
4. An Introduction to Fungi.-- H. C. Dube, 1990. Vikas Publishing House Pvt. Ltd., Delhi.
5. Cryptogamic Botany Vol. I & II (2nd Edition), M. S. Gilbert, 1985. Tata Mcgraw Hill Publishing Co., Ltd New Delhi.
6. Fungi- B. R. Vashishtha (1996)
7. Fungi- B. P. Pandey (1994)
8. Introduction to Fungi - Sundrarajan (2001)
9. Introductory Mycology - C. J. Alexopoulos, C. W. Mims, M. Blackwell
10. Cryptogamic Botany Vol. I - Algae and Fungi - G. M. Smith (1974)
11. Hand BooK of Organic Farming and Biofertilizers- M. K. Gupta ; ABD Publisher, Jaipur India- 2007.
12. Mushroom - Cultivation, Processing and Uses- B. C. Saman and V. P. Sharma- Agrobios India- 2005.

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Semester: I Botany - Paper II

BOTANY- DSC 1007 B

“Bryophytes, Pteridophytes and Gymnosperms (Archegoniates)”

Theory: 30 Hours Credits: 2

• **Course outcomes :**

1. Candidates trained will be able to identify and classify bryophytes, pteridophytes and gymnosperms.
2. Candidates' trained will be able to understand classification of bryophytes, pteridophytes and gymnosperms.
3. Candidates trained will be able to know the sustainable utilization of these plants to the society.

• **Syllabus :**

Unit. 1 : Bryophytes and Pteridophytes

1a. Bryophytes (10 hrs)

General characters, Adaptation to habitat , Classification (As per G. M. Smith) upto class, **Alternation of Generation**, Economic importance.

Morphology, Anatomy and Life Cycle (Excluding developmental stages)

Hepaticopsida - *Riccia*

Anthocerotopsida- *Anthoceros*

1b. Pteridophytes (10 hrs)

General characters, Classification (As per G. M. Smith) upto class.

A. Morphology, **Anatomy & Life Cycle** (Excluding developmental stages) of

1. Lycopsida- *Selaginella*

2. Pteropsida - *Pteris*

B. Heterospory and seed habit in Pteridophytes

Unit. 2: Gymnosperms

(10 hrs)

2 a .General characters, Classification (As per Sporne, 1965) upto Class with characters and suitable examples. Economic importance of gymnosperms.

2 b. Morphology, Anatomy and Life Cycle (Excluding developmental stages) of *Cycadopsida- Cycas*.

2 c. **Evolutionary significance of Gymnosperms .**

Reference Books :

Bryophytes –

1. Bryophytes. P. Puri, 1985. Amarm & Sons, Delhi.
2. College Botany - S. Sundararajan (1999)
3. College Botany Vol. I - H. C. Gangulee, Das K. S. and Datta C. T. (1991)
4. College Botany Vol. II - H. C. Gangulee and Kar A. K. (1999)
5. College Botany Vol. III -- S. K. Mukharji (1990)
6. Cryptogamic Botany Vol. I- G. M. Smith (1955)
7. Cryptogamic Botany: Bryophytes and Pteridophytes - G. C. Smith (1955)

Pteridophytes—

1. An Introduction to Pteridophytes - A. Rashid (1978)
2. An Introduction to Pteridophyta (Diversity and Differentiation) -A. Rashid (1976)
3. A Text book of Pteridophyte – S. N. Pandey, P. S. Trivedi, S. P. Misra (1995)
4. An Introduction to Embryophyta - N. S. Parihar (1961)
5. Morphology and Evolution of Vascular Plants- E. M. Gifford and A. S. Foster, 1989. W.H. Freeman & Co., New York.
6. Morphology of vascular Plant (lower groups) -- A. J. Eames.
7. Illustrated Manual of Ferns of Assam -S. K. Borthakur, P. Deka, K. K. Nath (2000)
8. Pteridophyta – Vascular Cryptogams - P. C. Vashishta (1972)
9. Botany for Degree Students- Pteridophyta (Vascular Cryptogams) - P. C. Vashishta, A. K. Sinha, Anil Kumar – S Chad – Multicolour Illustrative Revised Edition- 2006.

Gymnosperms –

1. Botany for Degree Students- Gymnosperms (Vascular Cryptogams) - P. C. Vashishta, A. K. Sinha, Anil Kumar – S Chad – Multicolour Illustrative Revised Edition- 2006.
2. The Moropology of Gymnosperms. -- K. R. Sporne, 1991. B. I. Publications Pvt., Bombay, Calcutta, Delhi.
3. Morphology of Gymnosperms -- J. M. Coulter and C. J. Chamberlain.
4. Gymnosperms – Structure & Evolution.-- C. J. Chamberlain
5. Morphology of Gymnosperms.-- K. R. Sporne.
6. Gymnosperms- P. C. Vashishta (1976)
7. Gymnosperms- C. J. Chamberlein (1966)
8. Indian Gymnosperms in Time and Space - C. G. K Ramanujan. (1979)
9. Origin and Evolution of Gymnosperms - Ed Charles B. Beck (2002)
10. Phylogeny and form in the plant Kingdom - H. C. Dittmer (1964)

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Semester: II Botany - Paper III

BOTANY- DSC 1007 C

" Plant Ecology "

Theory: 30 Hours Credits: 2

• **Course outcomes :**

1. Candidates trained will be able to understand the basic components of ecology.
2. Candidates trained will be able to understand various species interactions.
3. Candidates trained will be able to understand ecological succession.
4. Candidates trained will be able to understand ecosystem and phyto geography.

• **Syllabus :**

Unit. 1. Ecological factors and Plant communities (15 hrs)

1a. Introduction and definition of Ecology

1b. Ecological factors:

- i. **Edaphic factors**- Soil: Origin and formation. Composition- soil water, soil air, soil temperature, soil organic matter and soil microbes.
- ii. **Climatic factors**- Light , Temperature, Precipitation , atmospheric humidity and Rainfall
- iii. **Ecological adaptations** – Hydrophytes , Xerophytes, Epiphytes and Parasites
- iv. **Soil Pollution** - Preventive and Curative methods

1c. **Ecological Succession**

Introduction, **Process of succession** ,Types of succession - Hydrosere , Xerosere.

1d. **Ecological Interaction**

Intraspecific interaction (Cooperation, communication, competition) and **Interspecific interaction (Symbiosis , Commensalism, Parasitism and Predation).**

Unit 2. Ecosystem and Phyto-geography (15 hrs)

2a. Ecosystem - Introduction, Composition & Types.

2b. **Terrestrial ecosystem, Food chain , Food web and Ecological Pyramids.**

2c. Phytogeographical regions of India (as per Chatterjee and Mani).

Reference Books :

Ecology --

1. A Text Book of Plant Ecology. -- R.S. Ambasht. 1988 Students Friends Co. Varanasi.
2. Plant Ecology-- J. E. Weaver and F. E. Clements. 1966. Tata McGraw Publishing Co. Ltd. Bombay.
3. Ecology: Principles and Applications - J.L. Chapman and M.J. Reiss, 1995. Cambridge University Press.
4. Methods in Plant Ecology.-- P. W. Moore and S. B. Chapman, 1986. Blackwell Scientific Publication.
5. Fundamentals of Ecology. -- M.C. Dash, 1993. Tata McGraw Hill Publishing Co. Ltd., New Delhi.
6. Plants and Environment- A Text Book of Plant Ecology – R.F. Daubenmire, 1974. (3rd edition). John Wiley & Sons. New York.
7. Elements of Ecology. -- L.R. Smith and T.M. Mith, 1998. (4th edition). An imprint of Addison Wesley, Longman ink., California.
8. Modern Concepts of Ecology (3rd edition). -- H.D. Kumar, 1996. Vikas Publishing House Pvt., Ltd. Delhi.
9. General Ecology. -- H.D. Kumar, 1997. Vikas Publishing House Pvt. Ltd., Delhi.
10. Concepts of Ecology.-- .F.J. Kermondy, 1996. Prentice Hall of India Pvt. Ltd., New Delhi.
11. Soils-An Introduction to Soil and Plant Growth-- W.R. Miller and Donahue.R.L. 1992. (6th edition). Prentice Hall of India Pvt. Ltd., New Delhil.
12. Fundamentals of Ecology.-- E.P. Odum, 1996. Natraj Publishing, Dehradun.
13. Hot Spots of Endemic Plants of India Burma & Nepal-- M.P. Nayar 1996.
14. Ecology and Field Biology -- L.R. Smith. 1996. (5th edition). Harper Collns College Publishers, USA.
15. Environment and Pollution-- R. S. Ambasht. 1990. Students Friends and Co. Varanasi, India.
16. Experimental Plant Ecology-- P. Kapur and S. R. Govil, 2000. S.K. Jain for CBS Publishers and Distributors, New Delhi.
17. Ecology Work Book.-- R. Misra 1968. Oxiord and IBH, New Delhi.
18. Ecology and Field Biology.-- R.L. Smith. 1990 (4th edition). Harper Collins New York.
19. College Botany – Dr. B. P. Pandey, S. Chand and Company Ltd. , New Delhi.

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Semester: II Botany - Paper IV

BOTANY- DSC 7 D

“ Angiosperms Taxonomy ”

Theory: 30 Hours Credits: 2

• **Course outcomes :**

1. Candidates trained will be able to understand the morphology of flowering plant.
2. Candidates trained will be able to understand the classification of flowering plant.
3. Candidates trained will be able to understand the morphological, floral, distinguishing characters and economic importance of families.

• **Syllabus :**

Unit 1. Angiosperms Taxonomy

(18 hrs)

- 1a. Salient features of Angiosperms.
- 1b. Taxonomy – Introduction, Function (Identification, Nomenclature and classification), Importance.
- 1c. Salient features of International Code of Botanical Nomenclature (ICBN).
- 1d. Bentham and Hooker’s System of classification with its Merits and demerits.
- 1e. Morphological, floral, distinguishing characters and economic importance of following families.
 - i. Malvaceae
 - ii. Solanaceae
 - iii. Nyctaginaceae
 - iv. Amaryllidaceae

Unit 2. Morphology and modifications in Angiosperms

(12 hrs)

- 2a. Morphology and modification of Root.
- 2b. Morphology and modification of Stem.
- 2c. Morphology and modification of Leaf.

Reference Books :

Angiosperms ---

1. Principles of Angiosperm Taxonomy – P. H. Davis, Heywood V. M. (1963)
2. The evolution and classification of flowering plants. – A. Cronquist, 1968. Thomas Nelson (Printers) Ltd., London & Edinburgh.
3. Plant Diversification. --Delevoryas, Th. 1965 Modern Biology Series, Half Rinehart &Winston, New York.
4. Comparative Morphology of Vascular Plants. - A. S. Foster and Gifford, A.E.M. jr. 1967. Vakils, Peffer & Simons Pvt., Ltd.
5. The Morphology of Angiosperms. -- K.R Sporne, 1977. B.I. Publication, Bombay.
6. The Embryology of Angiosperms. -- S.S. Bhojwani and Bhatnagar, S.P. 2000. 4th revised and enlarged edition. Vikas Publishing House, Delhi.
7. Embryology of Angiosperms. -- B.M. Johri, 1984. Springer-Verlag Berlin.
8. Molecular Embryology of Flowering Plants. -- V. Raghvan, 1997. Cambridge University Press New York.
9. Principles of Angiosperm Taxonomy. -- P.H. Davis and V.H. Haywood, 1963. Oliver and Royd, London.
10. Current Concepts in Plant Taxonomy. -- V.H. Heywood and D.M. Moore 1984. Academic Press, London.
11. Plant Systematics (2nd edition). -- Jones, S.B. Jr. and Luchsinger, A.E. 1986. McGraw-Hill Book Co., New York.
12. Taxonomy of Vascular Plants. -- G.H.M. Lawrance, 1951. MacMillan, New York.
13. Taxonomy of Angiosperms. -- V.N. Naik, 1984. Tata McGraw Hill, New York.
14. Fundamentals of Plant Systematics -- A.E. Radford, 1986. Harper and Row, New York..
15. Plant Systematics: Theory and practice -- G. Singh, 1999. Oxford & IBH Pvt., Ltd. New Delhi.
16. An Introduction to Plant Taxonomy. -- C. Jeffrey, 1982. Cambridge University Press, Cambridge London.
17. Plant Taxonomy and Biosystematics. -- C.A. Stace, 1989. 2nd ed. Edward Arnold, London.
18. Contemporary Plant Systematics. -- D.E. Woodland. 1991. Prentice Hall, New Jersey.
19. Plant Systematics for 21st Century -- B. Nordenstam, El-Gazaly, G. and Kassas. M. 2000. Portland Press Ltd., London.-
20. Embryogenesis in Angiosperms: A Development and Experimental Study.-- V. Raghavan. Cambridge University Press New York. USA. 1986.
21. The flora of the Presidency of Bombay Volume- I, II & III. -- T. Cooke. (1958) Bishen Singh, Mahendra Pal Singh, Dehradun.
22. Taxonomy of the Angiosperms -- A. J. Eames.
23. Text book of systematic botany. -- R. N. Sutaria.
24. Methods of Descriptive systematic Botany -- A. S. Hitchcock.
25. Flora of Khandala -- H. Santapaun.
26. An Introduction to Embryology of Angiosperms. -- P. Maheshwari.
27. Endemic plants of India - M. Ahmeduilah & Nayar M. P.
28. Biodiversity in India – Floristic aspects -- R. R. Rao – 1995

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BOTANY Practical Based on Paper I, II, III, IV

“ Biodiversity in Cryptogams and Gymnosperms ”

60 Hours (75 Lectures) Credits: 2

1. Study of Forms of bacteria
2. Study of *Nostoc*
3. Study of *Spirogyra*
4. Study of Diatoms
5. Study of *Mucor*
6. Study of *Penicillium*
7. Study of VAM fungi
8. Study of Lichens
9. Study of *Riccia*
10. Study of *Anthoceros*
11. Study of *Selaginella*
12. Study of *Pteris*
13. Study of *Cycas*
14. Algal biofertilizer
15. Study of Water Holding Capacity of different soils
16. Determination of soil pH by Universal Indicator/ pH paper/ pH meter
17. Study of morphological and anatomical adaptations in hydrophytes- *Hydrilla*,
Eichhornia.
18. Study of morphological and anatomical adaptations in Xerophytes- *Aloe*, *Nerium*.
19. Study of morphological and anatomical adaptations in Epiphytes (Orchid) and Parasites
(*Cuscuta*).
20. Study of morphology and modification of Root.
21. Study of morphology and modification of Stem.
22. Study of morphology and modification of Leaf.
- 23- 26. Study of Vegetative and Floral characters of following plant families Malvaceae,
Solanaceae, Nyctaginaceae and Amaryllidaceae

Distribution of Marks for B. Sc. I- BOTANY Practical

Sr. No.	Name of topic	Marks
1.	Bacteria / Lichen /VAM/Biofertilizer	04
2.	Algae	05
3.	Fungi	05
4.	Bryophyte	04
5.	Pteridophytes/ Gymnosperms	04
6.	Ecology	10
7.	Angiosperm	08
8.	Journal	05
9.	Tour report	05
	Total	50

Details of Practical Examination

A) Every candidate must produce a certificate- from Head of the Dept. in his /her college, stating that he / she has completed practical course in satisfactory manner as per guidelines laid down by Academic Council on the recommendations of Board of Studies in Botany. The student should record his / her observations and report of each experiment should be written in the journal. The journal is to be signed periodically by teacher in charge and certified by the Head of the Department at the end of year. Candidates have to produce their certificate journal and tour report at the time of practical examination. Candidate is not "allowed to appear" for the practical examination without a certified journal / a certificate from Head of the Botany Dept. regarding the same.

B) Practical Examination shall be of Five hours duration and shall test a candidate in respect of the following.

1. Practical study of external and internal structures of different plant types and their classification. Making temporary stained preparations and identification.
2. Identification and setting of physiological and biochemical experiments.
3. Study of plant families as per syllabus,
4. Spotting of the specimens as per syllabus.

Botanical Excursions

One teacher along with a batch not more than 20 students be taken for botanical excursion to places of Botanical interest (Nursery, Botanical garden, Polyhouse). If there are female students in a batch of twenty students, one additional lady teacher is permissible for excursion. Each excursion will not be more than three days during college working days. T.A. and D.A. for teachers and non-teaching staff participating in excursions should be paid as per rules. Tour report duly certified by teacher concerned and Head of the Department should be submitted at the time of practical examination.

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Botany

EXAMINATION FEBRUARY/ MARCH - 2022

PRACTICAL

Time : 5 Hours 11.00 am onwards

Marks : 50

N. B.: Draw neat labeled sketches wherever necessary.

Record your observation carefully and neatly wherever asked.

Que. 1) Identify the specimen 'A', 'B' & 'C'. Make one slide of each specimen.

(Leave your preparation for inspection). (12)

Que. 2) Assign the specimen 'D' to its respective family on the basis of vegetative and floral

Characters. Draw floral formula \ floral diagram. (06)

Que. 3) Set up the Ecological experiment 'E' assigned to you OR study the ecological type given to you.

(08)

Que. 4) **Identification** (14)

- i) Identify and comment on the specimen/slide - F
- ii) Identify and comment on the specimen/slide - G
- iii) Identify and comment on the specimen/slide - H
- iv) Identify and comment on the specimen/slide - I
- v) Identify and comment on the specimen/slide - J
- vi) Identify and comment on the specimen/slide - K
- vii) Identify and comment on the specimen/slide - L

Que. 5) Journal (05)

Tour report (05)

Evaluation:

Sr. No.	Internal Examination DSC Course				Total (a+b+c+d)	Conversion of 80 marks in Total(I) (e)	SEE (Semester End Examination) DSC Course		Total (II) (f+g)= h	Total (I and II) (e+h) = i
	Paper-I (Two tests each of 10 marks) (a)	Paper- II (Two tests each of 10 marks) (b)	Home assignm ent Paper I (c)	Home assignm ent Paper II (d)			Paper-I (f)	Paper- II (g)		
1	20	20	20	20	80	20	40	40	80	100

Practical Examination B.Sc.- I

Sr.No.	Lab work	Journal (Punctuality, Neatness)	Attendance, and participation in the practical's, motivation	Total
1	40	5	5	50