

**Shiksha Mandal's
Bajaj College of Science, Wardha**

**Proposed Syllabus for Four Year Multidisciplinary UG
Program with DSC as Major
(Four Year B.Sc. Honors/Research Program)**

**Program: B.Sc.
(Academic Session 2023-24)
Syllabus**

DISCIPLINE SPECIFIC CORE (DSC)

**Semester I and II courses in
Botany**

Syllabus under Autonomy

PLANT DIVERSITY - I

[Credits 6]

[60L + 60P]

Course Description: To acquaint the students about the morphology, biology, ecological and economical importance of microbes, algal organisms, fungal organisms, lichens, and bryophytes.

Course Objectives:

- To study the diversity & distribution of microbes
- To study the ultrastructure and reproductive features of viruses and bacteria
- To study the diversity distribution, thallus organization, reproduction, and economic significance of Cyanobacteria, Algae, Fungi and Bryophytes.
- To study the plant diseases caused by microbes.
- To understand the economic and ecological importance of lower cryptogams.

Course learning outcomes:

The course will enable students to know the earlier plants, their vegetative and reproductive structures, and their importance.

Unit I: Microbiology

[10 Hrs.]

- 1.1 Virus: General Account of Viruses and structure of TMV and HIV; Mycoplasma: Structure, Reproduction.
- 1.2 Bacteria: Cell structure, Reproduction: (Binary fission, Conjugation)
- 1.3 Cyanobacteria: General account, Ultra cell structure, reproduction (e.g., *Nostoc*).
- 1.4 Role of microbes in Agriculture, Medicine, and Industries.

Unit II: Algae

[10 Hrs.]

- 2.1 General characteristics, Distribution and Ecology of Algae (Range of Habit, Thallus, Pigmentation, Reserve food and reproduction)
- 2.2 Classification of Algae (F.E. Fritsch, M.O.P. Iyengar)
- 2.3 Life history of *Oedogonium*, *Vaucheria*, *Chara*, *Ectocarpus*
- 2.4 Economic Importance of Algae, Role of Algae in Environment, Agriculture, Industry and Biotechnology

Unit III: Fungi

[10 Hrs.]

- 3.1 General characteristics; Affinities with plants and animals; Thallus organization
- 3.2 Cell wall organization; Nutrition; Classification (Alexopoulos, 1996)
- 3.3 Medical Mycology, Economic Importance of Fungi in Biotechnology
- 3.4 Life history of *Albugo*, *Mucor*, *Puccinia*, *Cercospora*

Unit IV: Symbiotic Associations

[10 Hrs.]

- 4.1 Symbiotic Associations – Lichens and Mycorrhiza
- 4.2 Lichens – Growth forms, Range of thallus,
- 4.3 Ecological and economic importance of Lichens.
- 4.4 Mycorrhiza – Ectomycorrhiza, Endomycorrhiza and their significance.

Unit V: Plant Pathology

[10 Hrs.]

- 5.1 General symptoms, Host-pathogen relationship, Prevention, and control
- 5.2 Bacterial Disease – Citrus canker, Angular leaf spot of Cotton
- 5.3 Viral Disease – Leaf curl of papaya, Yellow vein mosaic of Lady's finger (Bhindi)

5.4 Fungal disease – Red rot of sugarcane, Early blight of potato

Unit VI: Bryophyta

[10 Hrs.]

- 6.1 General characteristics, adaptations to land habit, alternation of generations.
- 6.2 Classification of Bryophyta (Whittakar, 1969)
- 6.3 Life cycle of *Marchantia* and *Funaria* (excluding developmental stages)
- 6.4 Ecological and Economic Importance

Practicals:

[60 Hrs.]

1. Study of Bacterial forms from permanent micro-preparation
2. Gram staining of Bacteria.
3. Study of Cyanobacteria: *Nostoc*.
4. Study of Algal genera: *Oedogonium*, *Chara*, *Vaucheria*, *Ectocarpus*.
5. Study of Fungal genera: - *Albugo*, *Mucor*, *Puccinia*, *Cercospora*
6. Study of Lichen: - Thallus structure, Types
7. Bacterial Disease – Citrus canker, Angular leaf spot of Cotton
8. Viral Disease – Leaf curl of papaya, Yellow vein mosaic of Lady's finger (Bhindi)
9. Fungal disease – Red rot of sugarcane, Early blight of potato
10. Study of Bryophytes: - *Marchantia* and *Funaria*
11. Botanical Excursions (One short/Long excursion is compulsory)

REFERENCE BOOKS:

- Alexopoulos, C. J. and G. W. Min & M. Blackwell, Introductory Mycology, CBS distributors & publishers, Delhi.
- Bierhorst, D. W. (1971): Morphology of Vascular Plants (Macmillon & Co. N.Y.)
- Bold, H. C. and M. J. Wynne (1978): Introduction of Algae: Structure and Reproduction (Prentice Hall of India, Pvt. Ltd)
- Bold, H.C. C. J Alexopoulos and T Delevoryas (980): Morphology of Plants and Fungi (Harper and Row Publishers, N.Y.)
- Chopra, G. Land D I Yadav (1980): A text Book of Bryophyta (Arihant Press)
- Dube, H. C. (1990): Introduction to Fungi (Vikas Publishing House Pvt. Ltd, Delhi)
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- Ganguly, Kar: College Botany, Vol II. New Central Book Agency, Calcutta.
- John Jothi Prakash, E. 2004: Outlines of Plant Biotechnology. Emkay Publication, New Delhi.
- Kumar, H. D. and HN Singh (1982): A text Book of Algae. Affiliate East - West Press, Pvt.
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- Prescott et al. (1999): Microbiology 3rd ed. Wm C Brown Pub.
- Ram Udar (1970): An Introduction to Bryophyta. Shashidhar Malviya Prakashan, Lucknow
- Sathe, T.V. (2004): Vermiculture and Organic Farming. Daya Publishers,
- Sharma, O.P. (1992): Text Book of Thallophytes (McGraw Hill Publishing Co.)
- Smith, G. M. (1971): Cryptogamic Botany, Vol. I Algae and Fungi (TMH)
- Sharma, P. D. (1991): The Fungi (Rastogi & Co. Meerut)
- Sharma, P.D. (1993): Microbiology and plant pathology (Rastogi & Co)
- Smith, G. M. (1971): Cryptogamic Botany, vol. I I, Bryophytes and Pteridophytes (THM)
- Smith, K. M.: Plant Viruses (1992) 6th Ed University Book Stall, New Delhi)
- Subha Rao, N.S. (2000): Soil Microbiology, Oxford & IBH Publishers, New Delhi.
- Sullia, S. B. (1998): General Microbiology (Oxford & IBH)
- Swaminathan, M. (1990): Food and Nutrition. Bappco, The Bangalore Printing and

Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.

- Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.
- Nita Bahl (1984-1988): Hand book of Mushrooms, II Edition, Vol. I & Vol. II.
- Tortora, G. E. B. R. Funke, C. L Case U (1997): Microbiology, An Introduction, 6th Ed (Addison Neslley Logman, Inc.)
- Vashishtha, B. R. (1992): Bryophyta (S. Chand & Co. New Delhi)
- Vashishtha, B. R. (1990): Algae (S. Chand & Co. New Delhi)
- Vashishtha, B. R. (1990): Fungi (S. Chand and Co. New Delhi)
- Vayas, S. C, Vayas, S. and Modi, H. A. (1998): Bio-fertilizers and organic Farming AktaPrakashan.

**B.Sc. Semester – I Botany
Practical Examination Question Paper**

Time: 7 hrs.

Marks: 35

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| Q.1. | Gram Stain given Bacterial strain / Stain the Cyanobacterial material and Identify | 04 |
| Q.2. | Identify & give characters of the given Algal material and make a temporary Mount | 06 |
| Q.3. | Identify & give characters of the given Fungal material and make a temporary Mount | 06 |
| Q.4. | Identify & give characters of the given Bryophytic material and make a temporary mount | 06 |
| Q.5. | Spotting | 08 |
| | A. Algae | B. Fungi/ Plant Pathology |
| | C. Bryophyte | D. Lichen |
| Q.6. | Viva-voce | 05 |

PLANT DIVERSITY - II

[Credits 6]

[60L + 60P]

Course Description: To acquaint the students about the morphology, biology, evolutionary trends, ecological and economical importance of Pteridophyta, Gymnosperms, Angiosperms

Course Objectives:

- To study the diversity and biology and reproductive structures of pteridophytes, gymnosperms and angiosperms.
- To study the process of fossilization and fossil plants.
- To study the morphological features, types, and modifications of plant parts.
- To study the utilization of angiosperms.

Course learning outcomes:

The course will enable students to know the structure, evolution, biology and reproduction of vascular plants along with the knowledge of utilization of plants.

Unit I: Pteridophyta

[10 Hrs.]

- 1.1 Distinguished features, Classification, Ecological and Economic Importance of Pteridophyta
- 1.2 General Characters (Psilopsida, Lycopsida, Sphenopsida and Pteropsida)
- 1.3 Life history of *Rhynia*, *Selaginella* and *Equisetum* (excluding developmental stages)
- 1.4 Apogamy and Apospory; Heterospory and seed habit; Telome theory, Stellar system in Pteridophytes

Unit II: Paleobotany

[10 Hrs.]

- 2.1 Introduction to Paleobotany, Geological time scale
- 2.2 Fossilization: Replacement theory, Infiltration theory
- 2.3 Types of fossils: Impression, Compression, Petrification
- 2.4 Fossil plants: Gymnosperms: *Glossopteris* (Leaf, Scutum), *Cycadeoidea* (morphology, anatomy of Stem and flower)

Unit III: Gymnosperms

[10 Hrs.]

- 3.1 General characteristics, Ecological and Economic importance
- 3.2 Classification of Gymnosperms (Stewart, 1983)
- 3.3 Life cycle of *Cycas*, *Pinus* and *Gnetum* (excluding developmental stages)
- 3.4 Affinities of Gymnosperms with Pteridophytes and Angiosperms

Unit IV: Angiosperm Morphology I

[10 Hrs.]

- 4.1 Diversity in Plant habits
- 4.2 Roots – Types and modifications
- 4.3 Stem – Types and modifications
- 4.4 Leaf – Types (simple, compound), Phyllotaxy, Venation, Modifications

Unit V: Angiosperm Morphology II

[10 Hrs.]

- 5.1 Inflorescence – Simple (Racemose, Cymose and special types)
- 5.2 Flower: Flower as modified shoot, Insertion of floral whorls,
- 5.3 Structure of Calyx, Corolla, Androecium and Gynoecium.
- 5.4 Fruit: Classification of fruits, Simple, Aggregate, Composite fruit and placentation

Unit VI: Utilization of Plants

[10 Hrs.]

- 6.1 Food Plants – Wheat, Rice – Morphology, varieties, and economic importance.

- 6.2 Fiber Plant – Morphology, varieties and economic importance of Cotton and Jute
 6.3 Oil yielding Plant – Morphology, Varieties, economic importance of Ground nut and *Brassica*
 6.4 Medicinal and Aromatic Plants – *Azadirachta indica*, *Cymbopogon*

Practicals:

[60 Hrs.]

1. Study of Pteridophytes: *Rhynia*, *Selaginella*, *Equisetum*.
2. Study of Gymnosperm: *Cycas*, *Pinus*, *Gnetum*, *Cycadeoidea*, *Glossopteris*.
3. Study of Root: Types, Modifications.
4. Study of Stem: shape, surface, texture, nature Branching, Modifications (Ex. *Hibiscus*, *Ocimum*, any grass).
5. Study of Leaf: Stipules, base, kind, shape, surface, margin, apex, texture, Phyllotaxy, Venation & Modifications.
6. Inflorescence: Types.
7. Flower: Parts, Thalamus, Calyx, Corolla, Androecium, Gynoecium.
8. Fruits: Types of fruits (Simple, Aggregate, Multiple)
9. Morphology of plant parts used, and medicinal plants prescribed in syllabi
10. Utilization of plants: food plants, fiber yielding plants and oil seed plants prescribed in syllabi

REFERENCE BOOKS:

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- Baker H.G. 1978. Plants and Civilization (3rd ed). C.A. Wadsworth, Belmont.
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- Vashishtha, B. R. (1992). Gymnosperm (S. Chand & Co. New Delhi)

**B.Sc. Semester – II Botany
Practical Examination Question Paper**

Time: 7 hrs.

Marks: 35

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| Q.1. | Identify and give characters of the given Pteridophyte material and make temporary mount. | 06 |
| Q.2. | Identify and give characters of the given Gymnosperm material and make temporary mount. | 06 |
| Q.3. | Describe the given leaf material | 05 |
| Q.4. | Describe (Calyx, Corolla, Androecium & Gynoecium) of given Flower | 05 |
| Q.5. | Spotting | 08 |
| | A. Pteridophyte B. Fossil | |
| | C. Gymnosperm D. Morphology | |
| Q.6. | Viva-voce | 05 |