



Hindi Vidya Prachar Samiti's
Ramniranjan Jhunjhunwala College of Arts, Science & Commerce
(Empowered Autonomous College)

Affiliated to
UNIVERSITY OF MUMBAI
Syllabus for the T. Y. B.Sc. (under NEP 2020)

Program: B.Sc. BOTANY

Program Code: RJSUBOT

Course Code: RJDSEBOT352

Discipline Specific Elective II Theory: Environmental Botany

RJDSEBOTP352

Discipline Specific Elective II Practical: Practical Environmental Botany

Semester V

(Revised syllabus in alignment with the NEP 2020 facilitating the inter and multidisciplinary learning and multiple entry and exit of the students)

Level 5.5

(CBCS)

(To be implemented from 2025-2026)

Preamble

The National Education Policy 2020 aims at imparting skill-based learning and caters to the multiple entry and exit facility for the students thus empowering them to acquire knowledge at their pace. In the three-year UG program, the student has two exit options. Students also have the option of choosing the Honors program of four years of study in each discipline and later converting it to a five-year integrated PG degree program. As an undergraduate student, he/she learns the core subject (Major), a subject complementing the core subject (Minor), a course from another discipline (OEC or GEC) Vocational and Skill Enhancement course from the Major (VSEC). The remaining verticals under NEP 2020 are IKS (Indian Knowledge System), AEC (Ability Enhancement Course), VEC (Value Education Course) and with progressive three years of UG, student also completes at different levels OJT (On Job Training), FP (Field Projects), CEP (Community Engagement Programme), RP (Research Project) which helps him/her in understanding their roots, application of the knowledge for the benefit of self and the society. Vertical CC (Co-curricular activities and activities related to yoga and human well-being) helps in preparing youth with good character and interpersonal relationships.

.

**Credit Structure for B. Sc. Semester V as per NEP 2020 Implemented from the
academic year 2025-2026 Major Subject: Botany Semester V Level 5.5 Major**

Courses	Credits	Total Credits	Course Titles
Discipline Specific Course (DSC): Theory I Biomolecules and Cell Biology	4	12	RJDSCBOT35 1
Discipline Specific Course (DSC): Theory II Reproductive Biology of Angiosperms	4		RJDSCBOT35 2
DSC: Practical I (Biomolecules and Cell Biology)	2		RJDSCBOTP3 51
DSC: Practical II (Reproductive Biology of Angiosperms)	2		RJDSCBOTP3 52
Discipline Specific Elective (DSE) I Theory Palaeobotany	2	4	RJDSEBOT35 1
Discipline Specific Elective (DSE) I Practical Palaeobotany	2		RJDSEBOTP3 51
Discipline Specific Elective Course (DSE) II Theory Environmental Botany	2	4	RJDSEBOT35 2
Discipline Specific Elective Course (DSE) II Practical Environmental Botany	2		RJDSEBOTP3 52
Vocational Skill Course (VSC) Systematic Botany Practical	4	4	RJVSCBOTP3 51
Field Project (FP)/ CEP	2	2	RJFPBOT351/ RJCEPBOT351
Total Credits	22	22	

***As per University Grid**

COURSE OUTCOMES (COs) B. Sc. BOTANY

SEMESTER	:	V MAJOR SUBJECT ELECTIVE DSE II
TITLE OF THE SUBJECT/COURSE	:	ENVIRONMENTAL BOTANY
COURSE CODE	:	RJDSEBOT352
CREDITS	:	2
DURATION	:	30 HOURS

LEARNING OBJECTIVES

1	Describe the stages and processes of plant succession in dry, arid and aquatic environments
2	Explain the principles and processes of bioremediation and phytoremediation in the context of environmental cleanup.
3	Understand the scientific basis of global climate change, its effects on the environment, and the contributing human activities.
4	Identify and evaluate various strategies and approaches for the conservation of biodiversity.

COURSE OUTCOME NUMBER	On completing the course, the student will be able to	PSO Addressed	BLOOMS LEVEL
CO1	Describe the stages of succession and understand the ecological transformations from aquatic to terrestrial habitats and arid habitats.	1	BT Level III, IV Apply draw conclusions
CO2	Explain and apply the principles of bioremediation and phytoremediation to real-world environmental problems.	1, 5	BT level III, IV and V Apply, analyse and evaluate
CO3	Analyse the sensitivity of agroecosystems to climate change and propose effective mitigation and adaptation strategies.	1,5	BT level III, IV and V Apply, analyse and evaluate
CO4	Evaluate and propose effective strategies for the conservation of biodiversity at local, national, and global levels.	1,5	BT level III, IV and V Apply, analyse and evaluate

B Sc. BOTANY SEMESTER V SYLLABUS

Course Code	Title	Credits 2
RJDSEBOT352	ENVIRONMENTAL BOTANY	30 hours
Unit I: Plant Succession 1. Hydrosere 2. Xerosere		
Unit II: Bioremediation and Phytoremediation 1. Bioremediation 2. Phytoremediation, Hyperaccumulators 3. Mycoremediation, Biosorption		
Unit III: Global Environmental Change 1. Key Environmental Issues 2. Global Climate Change 3. Sensitivity of Agro ecosystems to climate change		
Unit IV: Biodiversity and Environmental Conservation 1. Definition, Concepts related to quantification of biodiversity 2. Hotspots of Biodiversity 3. Keystone species, IUCN categories, Red Data Book Species 4. Strategies for conservation of Biodiversity		

Suggested References

1. Glenn-Lewin, D. C., Peet, R. K., & Veblen, T. T. (Eds.). (1992). *Plant succession: Theory and Prediction* (Vol. 11). Springer Science & Business Media.
2. Ansari, A. A. (2016). *Phytoremediation* (pp. 12-18). S. S. Gill, R. Gill, G. Lanza, & L. Newman (Eds.). Berlin, Germany: Springer International Publishing.
3. Druckman, D., Young, O. R., & Stern, P. C. (Eds.). (1991). *Global environmental change: Understanding the human dimensions*. National Academies Press.
4. Pellens, R., & Grandcolas, P. (2016). *Biodiversity conservation and Phylogenetic systematics: Preserving our evolutionary heritage in an extinction crisis* (p. 390). Springer Nature.

COURSE OUTCOMES (COs) B. Sc. BOTANY

SEMESTER	:	V MAJOR SUBJECT ELECTIVE DSE II PRACTICAL
TITLE OF THE SUBJECT/COURSE	:	ENVIRONMENTAL BOTANY
COURSE CODE	:	RJDSEBOTP352
CREDITS	:	2
DURATION	:	60 HOURS

LEARNING OBJECTIVES

1	Understand the concept of estimating dissolved oxygen, BOD, COD, total hardness, total dissolved solids, salinity, chlorinity, turbidity in any water sample
2	Learn to provide solutions to environmental issues related to water and air

Course outcome number	On completing the course, the student will be able to:	PSO Addressed	BLOOMS LEVEL
CO1	Estimate dissolved oxygen, BOD, COD, total hardness, total dissolved solids, salinity, chlorinity, turbidity of water samples	1	BT Level III, IV Apply draw conclusions
CO2	Implement the techniques of removing aromatic amines, dyes from wastewater.	1, 5	BT level III, IV and V Apply, analyse and evaluate
CO3	Measure the air quality and advice on the air quality index of a given locality and advice on how to improve the quality of air	1,5	BT level III, IV and V Apply, analyse and evaluate
CO4	Work as a team, plan industrial visits, learn techniques of analysis at industrial level, employment avenues in solving environmental issues.	1,5	BT level III, IV and V Apply, analyse and evaluate

B. Sc. BOTANY SEMESTER V BOTANY SYLLABUS

DISCIPLINE SPECIFIC ELECTIVE - II

Course Code	Practical Title	Credits
RJDSEBOTP352	ENVIRONMENTAL BOTANY	2
1. Estimation of the following in given water sample: A) Dissolved oxygen B) Biological Oxygen Demand C) Chemical Oxygen Demand D) Total Hardness E) Salinity and Chlorinity F) pH and Electrical Conductivity 2. Removal of aromatic amines from wastewater/Removal of dye from wastewater 3. Measurement of air quality 4. Field Trip to sewage treatment plants/ Industrial wastewater treatment plants/ water testing laboratory 5. Case study on Biodiversity conservation plan of a given area.		

Scheme of Examinations

1. Internal examination 20 marks by MCQ / Assignment / Project / Survey / Presentation/Seminar.
2. One External (Semester End Examination) of 30 marks. Duration: 1 hour.
3. One combined Practical Examination at the end of Semester consisting of 50 marks with minimum 20 marks for passing.
4. Minimum marks for passing Semester End Theory and Practical Exam are 40%.
5. Students must appear for the Semester End Examination to be able to complete total credits for a given Semester.
6. For any KT examinations, there shall be Examination on Demand and students must register for the same.
7. Two short field excursions for habitat studies (one per semester) are compulsory.
8. Field work with submission of field report of quality can be considered under 20 marks internal.
9. A candidate will be allowed to appear for the practical examinations if he/she submits a certified Journal of T.Y.B.Sc. DSE Botany or a certificate from the Head of the Department/Institute to the effect that the candidate has completed the practical course of T.Y.B.Sc. DSE Botany as per the minimum requirements.
10. In case of loss of journal, a candidate must produce a certificate from the Head of the Department/Institute that the practical for the academic year were completed by the student. However, such a candidate will be allowed to appear for the practical examination, but the marks allotted for the journal (if any) will not be granted.
11. HOD's decision, in consultation with the principal, shall remain final and abiding to all.

Evaluation and Assessment

(Based on the centralized guidelines given by EC under NEP 2020)

Evaluation (Theory): Total marks per course: 50

Internals - 20 marks

External- Semester End Examination – 30 marks

Question paper covering all units and topics.

Evaluation of Practical per Semester - 50 marks

Key to set effective question paper

Question	Remember & understand	Apply & Analyse	Evaluate & Create	TOTAL MARKS- Per unit
Unit 1 & 2	05	06	04	15
Unit 3 & 4	05	06	04	15
-TOTAL- Per objective	10	12	08	30
% WEIGHTAGE	33	40	27	100%

Mapping of the course to Local/ Regional/National/International relevance

The diversity existing in the Plant kingdom is unparalleled ranging from single cell to the tallest tree living on this planet. Plants represent the unique organism which fulfills the energy needs of all other organisms. With their unique metabolic capacity they can carry out biosynthesis of complex biomolecules at ambient temperature and pressure without polluting the surroundings, in fact help in obviating climate change. All courses contribute towards SDG 4 i.e. Quality Education

Class	Course Name	Course Code	Local relevance	Regional relevance	National relevance	International relevance
T.Y.B.Sc Botany Major DSEII	Environmental Botany Theory	RJDSEBOT352	✓	✓	✓	✓
T.Y.B.Sc Botany Major DSEII	Environmental Botany Practical	RJDSEBOTP352	✓	✓	✓	✓

Mapping of the course to Employability/ Entrepreneurship/Skill development

The courses in Botany have been designed to impart one or more skills to make students employable.

Class	Course Name	Course Code	Topic focusing on Employability/ Entrepreneurship/ skill development	Employability/Entrepreneurship/Skill development	Specific activity
T.Y.B.Sc Botany Major DSEII	Environmental Botany Theory	RJDSEBOT 352	All topics	Teaching, research, employment in environment testing laboratories, government lab, biodiversity parks, EIA, self-employment as a consultant	
T.Y.B.Sc Botany Major DSEII	Environmental Botany Practical	RJDSEBOT P352	All Practicals	Teaching, research, employment in environment testing laboratories, government lab, biodiversity parks, EIA, self-employment as a consultant	

Integration of Cross cutting Issues

Class	Course Code and Name	Cross Cutting Issues
T.Y.B.Sc Botany Major DSEII	RJDSEBOT352 RJDSEBOTP352 Environmental Botany	Ethics, Environment and Sustainability UNSDG 4, 13,15 NEP 2020 Interdisciplinary