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)

Program: B.Sc. BOTANY

Program Code: RJSUBOT

Discipline Specific Elective (DSE) II

Theory Title: Microbiology and Plant Pathology
Course Code: RJDSEBOT 362
&
Practical Title: Microbiology and Plant Pathology
Course Code: RJDSEBOTP362

Semester VI

(REVISED in 2025-2026 in alignment with the NEP2020 facilitating the inter-and multidisciplinary learning and multiple entry and exit of the students)
Level 5.5
(CBCS 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 study in a given discipline and later converting it to five-year integrated PG degree program. As an undergraduate student, he/she learns the core subject (Major), subject complementing the core subject (Minor), a course from other 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 Program) , 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.

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Credit Structure for B Sc Semester VI as per NEP 2020 Implemented from the academic year 2025-2026
Major Subject: Botany

Semester VI
Level 5.5 Major Botany

Courses	Credits	Total Credits	Course Titles
Major Theory I **Plant Physiology and Biochemistry**	**4**	**12**	**RJMAJBOT361**
Major Theory II **Genetics and Biostatistics**	**4**		**RJMAJBOT362**
Major Practical I	**2**		**RJMAJBOTP361**
Major Practical II	**2**		**RJMAJBOTP362**
Discipline specific Elective (DSE) I Theory **Economic Botany**	**2**	**4**	**RJDSEBOT361**
Discipline specific Elective (DSE) I Practical **Economic Botany**	**2**		**RJDSEBOTP361**
Discipline Specific Elective Course (DSE) II **Microbiology and Plant Pathology**	**2**	**4**	**RJDSEBOT362**
Discipline Specific Elective Course (DSE) II **Microbiology and Plant Pathology**	**2**		**RJDSEBOTP361**
Vocational Skill Course (VSC) **Plant Anatomy**	**2**	**2**	**RJVSCBOTP362**
On Job Training (OJT)	**4**	**4**	**RJOJTBOT361**
Total Credits	**22**	**22**	

***As per University Grid**

T.Y.B..Sc. Semester VI Botany Syllabus

Course Code	Unit	Topic Headings	Credits	Duration
RJDSCBOT361	**Paper Title: Plant Physiology and Biochemistry**			**(60 hours)**
	I	Enzymes	4	
	II	Nitrogen metabolism		
	III	Vegetative growth		
	IV	Photomorphogenesis		

Course Code	Unit	Topic Headings	Credits	Duration
RJDSCBOT362	**Paper Title: Genetics and Biostatistics**			**(60 Hours)**
	I	Genetic mapping in Eukaryotes	4	
	II	Gene mutations		
	III	Extra chromosomal Inheritance		
	IV	Biostatistics		

Course Code	Unit	Topic Headings	Credits	Duration
RJDSCBOTP361	**Practical Title: Plant Physiology and Biochemistry**			**(60 hours)**
	I		2	

Course Code	Unit	Topic Headings	Credits	Duration
RJDSCBOTP362	**Practical Title: Genetics and Biostatistics**			**(60 hours)**
	I		2	

Elective Course 1

Course Code	Unit	Topic Headings	Credits	Duration
RJDSEBOT361	**Paper Title: Economic Botany**			**(30 hours)**
	I	Fibers and Fiber yielding plants	2	
	II	Minor Cereals and Small grains		
	III	Essential Oil		
	IV	Spices and other flavoring materials		

Course Code	Unit	Topic Headings	Credits	Duration
RJDSEBOTP361	**Practical Title: Economic Botany**			**(60 hours)**
	I		2	

Elective Course 2

Course Code	Unit	Topic Headings	Credits	Duration
RJDSEBOT362	**Paper Title : Microbiology and Plant Pathology**			**(30 hours)**
	I	Types of microbes, Culturing of microbes	2	
	II	Role of microbes in fermentation		
	III	Plant pathology terms, plant diseases caused by fungi, bacteria and virus one example each		
	IV	Prevention and control measures for plant diseases		

Course Code	Unit	Topic Headings	Credits	Duration
RJDSEBOTP362	**Practical Title: Microbiology and Plant Pathology**			**(60 hours)**
	I		2	

Course Code	Unit	Topic Headings	Credits	Duration
RJVSCBOTP361	**Practical Title: Plant Anatomy**			**(60 hours)**
	I		2	

Course Code	Unit	Topic Headings	Credits	Duration
RJOJTBOT361	**Paper Title: On Job Training (OJT)**			**(120 hours)**
			2	

COURSE OUTCOMES (COs) B. Sc. BOTANY

SEMESTER	:	VI MAJOR SUBJECT DSE II
TITLE OF THE SUBJECT/COURSE	:	MICROBIOLOGY AND PLANT PATHOLOGY (THEORY)
COURSE CODE	:	**RJDSEBOT362**
CREDITS	:	2
DURATION	:	30 HOURS

LEARNING OBJECTIVES	
1	Develop understanding the concept of microbial nutrition and growth
2	Understand the techniques of strain selection, large scale cultivation of microbes for production of commercially viable products
3	Understand the various plant diseases, their causes, symptoms and control measures

COURSE OUTCOME NUMBER	On completing the course, the student will be able to:	PSO Addressed	BLOOMS LEVEL
CO1	Understand the nutritional requirement of microbes, aseptic techniques.	1	BT Level III, IV Apply draw conclusions
CO2	Understand the mechanism of scaling up for product formation and recovery	1, 5	BT level III, IV and V Apply, analyze and evaluate
CO3	Understand the causative agents for various plant diseases, identify them and understand the mechanism of infection,	1,5	BT level III, IV and V Apply, analyze and evaluate
CO4	Identify Plant diseases according to the locations and device control measures.	1,5	BT level III, IV and V Apply, analyze and evaluate

B Sc. BOTANY SEMESTER VI Botany Syllabus

Course Code	Title	Credits
RJDSEBOT362	MICROBIOLOGY AND PLANT PATHOLOGY	2 30 hours
Unit I: Types of Microbes ➢ Types of microbes ➢ Culturing: Sterilization, media preparation, staining, colony characterization, pure cultures		
Unit II: Role of microbes in fermentation ➢ Alcoholic fermentation ➢ Production of Penicillin		
Unit III: Plant Pathology ➢ Terms, plant diseases caused by fungi, bacteria, virus, insect pest (one example each) ➢ Causative organism, symptoms, predisposing factors, disease cycle and control measures of wheat rust (*Puccinia*).		
Unit IV: Prevention and Control measures of plant diseases ➢ Study of Physical, chemical and biological control of plant diseases ➢ Integrated Pest Management (IMP)		

Suggested References

1. Pelczar M J (2001). Microbiology, 5th edition, Tata Mc Graw-Hill Co. New Delhi.
2. Wiley J M, Sherwood, L M and Woolverton C J (2013). Prescott's Microbiology, 9th Edition, Mc Graw Hill International.
3. Vashishta B R, Sinha A K and Kumar Adarsh (2016). Botany for Degree Students Fungi, S Chand and Co. New Delhi.
4. Sharma P D (2011). Plant Pathology Rastogi Publications, Meerut, India
5. Sharma T A, Dubey R C and Maheswari D K (1999). A textbook of Microbiology, S Chand and Co. New Delhi.

COURSE OUTCOMES (COs) B. Sc. BOTANY

SEMESTER	:	VI MAJOR SUBJECT DSE II
TITLE OF THE SUBJECT/COURSE	:	MICROBIOLOGY AND PLANT PATHOLOGY (PRACTICAL)
COURSE CODE	:	**RJDSEBOTP362**
CREDITS	:	2
DURATION	:	60 HOURS

LEARNING OBJECTIVES	
1	Learn skills of media preparation, aseptic techniques
2	Learn skills in laboratory to identify microbes
3	Learn skills to culture microbes in culture medium employing aseptic techniques

COURSE OUTCOME NUMBER	On completing the course, the student will be able to:	PSO Addressed	BLOOMS LEVEL
CO1	Prepare culture medium for bacterial and fungal culture	1	BT Level III, IV Apply draw conclusions
CO2	Identify bacteria based on colony characterization, gram staining	1, 5	BT level III, IV and V Apply, analyze and evaluate
CO3	Design and conduct experiments to identify antimicrobial activities of plant extracts	1,5	BT level III, IV and V Apply, analyze and evaluate
CO4	Identify the common plant diseases	1,5	BT level III, IV and V Apply, analyze and evaluate

Course Code	Practical	Credits
RJDSEBOTP362	**MICROBIOLOGY AND PLANT PATHOLOGY**	**2**
❖ Types of microbes: Colony characters, Gram staining ❖ Study of aero microbiota by Petri plate exposed method, Fungal culture, bacterial culture ❖ Determination of Minimum Inhibitory Concentration (MIC) of sucrose against selected microorganism ❖ Study of antimicrobial activity by disc diffusion method ❖ Study of following Plant diseases – Cultivation of Mushroom - Pleurotus Wheat rust, Smut, Claviceps		

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. 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.
8. 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.
9. HOD's decision, in consultation with the Principal, shall remain final and abiding to all.

Evaluation and Assessment
(Based on the centralised 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.

Practical Examination - 50 marks
Continuous evaluation for practicals - 20 marks
Semester end examination - 30 marks

Question	**Knowledge**	**Understanding**	**Application And Analysis**	**Total Marks- Per Unit**
Unit 1 & 2	05	03	02	**10**
Unit 3 & 4	05	03	02	**10**
Short notes from topics covering all the units	05	03	02	**10**
-TOTAL- Per objective	15	09	06	**30**
% WEIGHTAGE	50	30	20	**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 fulfils 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 DSE II	Microbiology &Plant Pathology Theory	RJDSEBOT362	✓	✓	✓	✓
T.Y.B.Sc. Botany Major DSE II	Microbiology &Plant Pathology Practical	RJDSEBOTP362	✓	✓	✓	✓

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 DSE II	Microbiology &Plant Pathology Theory	RJDSEBOT362	All topics	Teaching, research, Pathological laboratories	
T.Y.B.Sc. Botany Major DSE II	Microbiology &Plant Pathology Practical	RJDSEBOTP362	All Practical's	Teaching, research, Pathological laboratories	Practical training

Integration of Cross cutting Issues

Class	Course Code	Cross Cutting Issues
T.Y.B.Sc. Botany Major DSE II	RJDSEBOT362 RJDSEBOTP362	Ethics, Environment UNSDG 4, 13 NEP 2020 Interdisciplinary