



Karmaveer Bhaurao Patil University, Satara

**Syllabus for
B. Sc. II (Seed Technology)**

**Under
Faculty of Science and Technology
(As per NEP 2020)**

With effect from Academic Year 2025-2026

Syllabus for Bachelor of Science (B. Sc.) Part – II Seed Technology

PREAMBLE:

The B. Sc. Seed Technology Course- will be effective from the academic year 2025 - 2026. It has been prepared to keep in view the unique requirements of B. Sc. Seed Technology students as per NEP-2020. The contents have been drawn up to accommodate the widening horizons of the discipline of biological sciences. The emphasis is to provide students with the latest information along with due weightage to the concepts of classical seed technology that they can understand and appreciate the current interdisciplinary approaches in the study of seed sciences and their role in societal development. The Course-content also lists new practical exercises so the students get a hands-on experience with the latest techniques that are currently in use. The Course-will also inspire students to pursue higher studies in Seed Technology, for becoming an entrepreneur, and enable students to get employed in plant-based industries.

GENERAL OBJECTIVES OF THE COURSE:

1. To impart the knowledge of seed science is the basic objective of this course.
2. To develop a scientific attitude among the students and to make the students open-minded, critical, and curious.
3. To develop skills in practical work, experiments, and laboratory materials.
4. To understand scientific terms, concepts, facts, phenomenon, and their relationships.
5. To make the students aware of natural resources and the environment.
6. To enable the students to acquire knowledge of seeds and related subjects to understand nature and the environment for the benefit of human beings.
7. To develop the ability for the application of acquired knowledge to improve agriculture and related fields to make themselves self-reliant.

PROGRAMME OUTCOMES:

After completing B. Sc. Program, the graduates will:

1. Graduate with proficiency in the subject.
2. Develop scientific attitude and become open minded, critical and curious so that they enter research field with a positive approach.
3. Develop skill in practical work, experiments and laboratory materials.

4. Become eligible to continue higher studies in their subject in India as well as abroad.
5. Become eligible to appear for the examinations for jobs in government organizations.
6. Become eligible to appear for jobs with minimum eligibility as science graduate.
7. Be able to establish their own entrepreneurial ventures.
8. Acquire increased ability of critical thinking, development of scientific attitude, handling of problems and generating solution, improve practical skills, enhance communication skill, social interaction, increase awareness in judicious use of plant resources by recognizing the ethical value system

PROGRAM SPECIFIC OBJECTIVES

After completing the B. Sc. (Seed Technology) program, students will:

1. The students are expected to understand the fundamentals, principles, concepts and recent developments in the seed technology.
2. The practical course is framed in relevance with the theory courses to improve the understanding of the various concepts in seed technology.
3. It is expected to inspire and boost interest of the students in seed technology.
4. To develop the power of appreciations, the achievements in science and role in nature and society.
5. To enhance student sense of enthusiasm for science and to involve them in an intellectually stimulating experience of Course in a supportive environment.

1. TITLE: Seed Technology

2. YEAR OF IMPLEMENTATION: 2025-2026

3. DURATION: 01 year

4. PATTERN: Semester examination

5. MEDIUM OF INSTRUCTION: English

6. ELIGIBILITY OF THE STUDENT:

As per guidelines obtained from university by following rules and regarding reservations by Govt. of Maharashtra

7. ELIGIBILITY OF THE CORE FACULTY:

As per the rules and regulations of the University Grants Commission (UGC) and the Government of Maharashtra

8. STRUCTURE OF COURSE: As per B.Sc. II NEP 2.0

Third Semester (Level 5.0)

Sr. No.	Course	Theory				Practical		
		Course Code	Title of Course	No. of lectures per week	Credits	Cours Code	No. of lectures Per week	Credits
1	Major	BSTT 231	Seed Physiology	2	2	BSTP 233	2	2
		BSTT 232	Seed Pathology and Seed Entomology	2	2			
2	Minor	BSTT 234	Principles of Seed Pathology	2	2	BSTP 236	2	2
		BSTT 235	Seed Production, Processing and Storage	2	2			
3	OE		-			BSTPOE III	2	2
4	VSC		Advanced Skills in Seed Technology Part-I	--	--	BSTPVSC I	2	2
5	SEC		Seed Illustrations and Photography			BSTPSEC I	2	2
6	AEC	BSTTAEC I	English	2	2			
7	IKS	BSTTIKS II	Indian Agriculture	2	2			

Fourth Semester (Level 5.0)

Sr. No.	Course	Theory				Practical		
		Course Code	Title of Course	No. of lecture s per week	Credits	Course Code	No. of lectures Per week	Credits
1	Major	BSTT 241	Recent Trends in Plant Breeding	2	2	BSTP 243	2	2
		BSTT 242	Seed Farm Management and Marketing	2	2			
2	Minor	BSTT 244	Techniques to improve Seed Production	2	2	BSTP 246	2	2
		BSTT 245	Seed Quality	2	2			
3	OE					BSTTOE IV	2	2
4	VSC		Advanced Skills in Seed Technology-II (Plant Collection, Identification & Preservation)	--	---	BSTPVSC II	2	2
5	SEC		Nursery Practices for Medicinal Plant			BSTPSEC II	2	2
6	AEC	BSTTAEC II	English	2	2	--	--	--
7	VEC	BSTTVEC II	Environmental studies in Seed Technology	2	2	--	--	--

9. Evaluation Structure: As per B.Sc. II NEP 2.0

Semester III

Course	Course Category	Course Code	Internal Evaluation (Best of two CCE Marks will be considered)			ESE	Total Marks	Credits
			CCE-I	CCE-II	CCE-III			
Major	T	BSTT 231	10	10	10	30	50	02
	T	BSTT 232	10	10	10	30	50	02
	P	BSTP 233	--	--	--	50	50	02
Minor	T	BSTT 234	10	10	10	30	50	02
	T	BSTT 235	10	10	10	30	50	02
	P	BSTP 236	--	--	--	50	50	02
OE	T	BSTTOE 3 (For IDS Courses)	05	--	05	15	25	01
	P	B*POE 3	--	--	--	25	25	01
OE	T	B*TOE 3 (For Humanities)	10	10	10	30	50	02
VSC	P	BSTPVSC 1	--	--	--	50	50	02
SEC	P	BSTPSEC 1	--	--	--	50	50	02
AEC	T	BSTTAEC 1	10	10	10	30	50	02
IKS	T	BSTTIKS 2	10	10	10	30	50	02
Total							550	22

Semester IV

Course	Course Category	Course Code	Internal Evaluation (Best of two CCE Marks will be considered)			ESE	Total Marks	Credits
			CCE-I	CCE-II	CCE-III			
Major	T	BSTT 241	10	10	10	30	50	02
	T	BSTT 242	10	10	10	30	50	02
	P	BSTP 243	--	--	--	50	50	02
Minor	T	BSTT 244	10	10	10	30	50	02
	T	BSTT 245	10	10	10	30	50	02
	P	BSTP 246	--	--	--	50	50	02
OE	T	B*TOE 4 (For IDS Courses)	05	--	05	15	25	01
	P	B*POE 4	--	--	--	25	25	01
OE	T	B*TOE 4 (For Humanities)	10	10	10	30	50	02
VSC	P	BSTPVSC 2	--	--	--	50	50	02
SEC	P	BSTPSEC 2	--	--	--	50	50	02
AEC	T	BSTTAEC 2	10	10	10	30	50	02
VEC	T	BSTTVEC 2	10	10	10	30	50	02
Total							550	22

10.OTHER FEATURES:

A) LIBRARY:

Reference Books, Textbooks, journals, and Periodicals are available in Institute and Departmental Library.
(Separate reference lists are attached along with the respective Course-syllabus)

B) EQUIPMENT:

a) Computer, LCD projector, visualizer, smart board

b) Laboratory Equipment:

- | | | | |
|-------------------------------------|-----------------------------|--------------|--------------|
| 1. Microscope with a digital camera | 2. Digital weighing balance | 3. pH meter | 4. Microtome |
| 5. Hot Air Oven | 6. Refrigerator | 7. Incubator | 8. Autoclave |



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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Botany

Programme: B. Sc.

Semester - III

Type: DSC V (Major-I)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course: BSTT 231: Seed Physiology (Major-I)

Course Objectives: By the end of the course, students will be able to:

- 1) Define fundamental terms like seed dormancy, germination, viability, and desiccation tolerance
- 2) Describe the role of plant hormones (e.g., ABA, GA) in seed dormancy and germination
- 3) Conduct standard tests for seed viability and vigor (e.g., tetrazolium test, germination test).
- 4) Distinguish between different types of seed dormancy based on physiological traits

Course Outcomes: By the end of the course, students should be able to:

- 1) Explain the physiological and biochemical processes underlying seed maturation, desiccation tolerance, and dormancy.
- 2) Implement seed priming or dormancy-breaking methods for improving germination performance.
- 3) Differentiate between orthodox and recalcitrant seeds based on physiological traits and storage behavior.
- 4) Propose innovative strategies for improving seed longevity and vigor in response to climate and storage challenges.

Module	Title and Contents:	Hrs.
Module -1:	Module -1: Seed Composition 1.1 Chemical composition of seed. 1.2 Synthesis of food reserves (carbohydrates, proteins and lipids). 1.3 Seed vigor, its measurement and crops productivity 1.4 Physiochemical properties of Seeds.	08
Module -2:	Module -2: Seed Dormancy 2.1 Concept, types and causes of seed dormancy. 2.2 Methods of breaking seed dormancy. 2.3 Advantages and disadvantages of seed dormancy. Seed viability, Seed longevity 2.4 Seed storage: Introduction, types of seed storage, factors affecting, deterioration during storage, Methods to minimize seed aging and deterioration.	07
Module -3:	Module: 3 Seed Germination 3.1 Concept, types and requirements of seed germination. 3.2 Pattern of water absorption. 3.3 Metabolism of storage product during seed germination. 3.4 Respiratory pathways during seed germination. Seedling abnormalities and their causes.	08
Module -4:	Module :4 Concept of Advanced Seed	

	4.1 Seed longevity behavior: orthodox and recalcitrant seed 4.2 Seed pelleting and coating (Artificial or synthetic seed production) 4.3 Micro propagation: techniques, significance, use, 4.4 Scope and limitations of Seed	07
Reference Books: - 1) Hayes, H.K., Immer, F.R., Smith D.C. “Methods of Breeding”. (Mc Graw Hill. Book Co. International, New York), 1955 2) Singh, B.D. “Plant Breeding Principles and Methodology”. (Kalyani Publishers, New Delhi), 2018 3) Allard, R.W. “Principles of Plant Breeding”. (W. John and Sons Inc., New York), 1999 4) Murray, D.R. “Seed Physiology”. Development, (Academic Press, New York), 1985 5) Joshi, A.K., Singh, B.D. “Seed Science and Technology”. (Kalyani Publishers New, Delhi), 2017 6) Agarwal, R.L. “Seed Technology”. (Oxford and IBHJ Publication, New Delhi), 1995		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20Marks): • CCE-I: Home Assignment: 10 Marks • CCE-II: Short and long answer questions Test/ Seminar/Open Book Test/Quiz/Case study/ Book review/Field work/ Industry visit: 10 Marks • CCE-III: MCQ Test :10 Marks • Note: Internal evaluation (Best of two CCE Marks will be considered)	End Semester Examination (30Marks): • Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M • Note: Conversion of 50 marks of ESE to 30 marks	



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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Botany

Programme: B. Sc.

Semester - III

Type: DSC VI (Major II)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course: BSTT 232: Seed Pathology and Seed Entomology (Major-II)

Course Objectives:

By the end of the course, students will be able to:

- 1) Define key terms related to seed-borne diseases, seed pathogens, and seed-infesting insects.
- 2) Summarize the impact of seed-borne infections and insect infestation on seed quality, viability, and crop productivity.
- 3) Differentiate between primary and secondary seed infections and infestation types.
- 4) Develop experimental protocols to test seed treatments for efficacy against specific pathogens.

Course Outcomes:

By the end of the course, students will be able to:

- 1) Identify common seed-borne pathogens and insect pests affecting major crops.
- 2) Describe the impact of seed health on crop yield, seed viability, and quality.
- 3) Perform seed health testing methods to detect pathogens and insect infestation
- 4) Apply the control measures of seed-borne pathogens.

Module	Title and Contents	Hrs.
Module -1:	Module -1: Introduction to Seed Pathology 1.1 Introduction, history, and importance of seed pathology. 1.2 Seed-borne diseases (Fungi-Smut, and rot disease. 1.3 Bacteria-Black rot and leaf spot, viruses-pea and bean seed borne mosaic). 1.4 Losses caused by seed-borne pathogens.	08
Module -2:	Module -2: Seed Infection and Management 2.1 Concept and significance of infection. 2.2 Mechanism of transmission of seed pathogens. 2.3 Preventive measures for seed borne pathogens practiced in India 2.4 Seed disease management.	07
Module -3:	Module-3: Introduction to Seed Entomology 3.1 History and importance of seed entomology. 3.2 General model of the life cycle of insects (Gradual, Complete, and	08

	Incomplete Metamorphosis). 3.3 Losses caused by insect pest. 3.4 Distinguishing characters of Seed entomology.	
Module -4:	Module-4: Seed Insect Pests and Their Management. 4.1 Study of the following insect pests with respect to the scientific name. 4.2 Marks of identification, nature of the damage, and their management: Jowar stem borer; Brinjal fruit Borer; Gram pod. 4.3 Stored Grain Pest: Lesser Grain borer; Rice Weevil; Rust red flour beetle; Khapra beetle; 4.4 Pulse beetle; Saw-toothed beetle.	07
Reference Books: - 1) Agarwal, R.N. "Seed Technology". Oxford, IBH Publishing, 1982 2) Agarwal, V.K., Sinclair, J.B. "Principles of Seed Pathology". Vols. I and II, CBS Publ., New Delhi, 1993 3) Agrawal, "Seed Technology". Edition, reprint, revised; Publisher, Oxford and IBH Publishing, 2018 4) Hutchins, J.D., Reeves, J.E., (Eds.). "Seed Health Testing: Progress Towards the 21st Century". CABI, Wallington, 1997 5) Joshi, A.K., Singh, B.D. "Seed Science and Technology". Kalyani Publishers, 2017 6) Paul, N. "Seed Pathology". MacMillan, London.1988 7) Suryanarayana, D. "Seed Pathology" Vikash Publ., New Delhi, 1978		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20Marks): • CCE-1: Home Assignment: 10 Marks • CCE-II: Short and long answer questions Test/ Seminar/Open Book Test/Quiz/Case study/ Book review/Field work/ Industry visit: 10 Marks • CCE-III: MCQ Test :10 Marks • Note: Internal evaluation (Best of two CCE Marks will be considered)		End Semester Examination (30Marks): • Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M • Note: Conversion of 50 marks of ESE to 30 marks



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Board of Studies in Botany

Programme: B. Sc.

Semester - III

Type: DSC P (Major Practical)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course: Practical Course-BSTP 233: (Practical Based on theory Syllabus Course BSTT 231 and 232)

Course Objectives:

By the end of the course, students will be able to:

- 1) Perform seed viability and vigor tests accurately using established protocols.
- 2) Carry out seed dormancy-breaking treatments such as scarification, stratification, or priming.
- 3) Explain the basis of seed health testing techniques and their diagnostic relevance.
- 4) Describe the lifecycle stages of major seed pests and their detection in stored seed.

Course Outcomes:

By the end of the course, students will be able to:

- 1) Conduct seed germination, tetrazolium, and accelerated aging tests using standardized procedures.
- 2) Analyze the influence of environmental factors (temperature, light, water) on seed germination and vigor test results.
- 3) Interpret the results of seed health tests to determine infection/infestation levels and identify responsible organisms.
- 4) Develop a seed health management plan for a selected crop based on lab results and pest/disease risk.

Practical No.	Title and Content (Any 15 of the following)	Hrs.
1	Study of Phenol test (Wheat and Paddy) and NaOH test (Any seed).	4
2	Study of Peroxidase and GA tests (Any seed).	4
3	Study of seed germination (epigeal and hypogeal) in 3 - 4 suitable / available crops. (2 monocots and 2 dicot)	4
4	Study of effects of environmental factors (Light and temperature) on seed germination.	4
5	Study of seed viability with the biochemical tests.	4
6	Study of pollen sterility and fertility (any four crops).	4
7	Seed pelleting and coating (artificial seed).	4
8	Preparation of culture (MS) medium,	4

9	Study of techniques of seed sterilization.	4
10	Demonstration of micropropagation.	4
11	Field visits to different seed production farms /units, seed Production Company (At least two visits)	4
12	Study of grain smut of Jowar.	4
13	Study of germination testing by the paper method.	4
14	Seed viability test by TTC method.	4
15	Study of seed-borne pathogens (Any five).	4
16	Microscopic examination of dry seeds for disease symptoms. (Any five).	4
17	Seed treatment by hand rotary duster.	4
18	Peroxidase and GA tests of any seeds.	4
19	Study of stored grain pests. (Any Five)	4
20	Visit to seed testing laboratory.	4

Reference Books:

- 1) Agarwal, V.K., Sinclair, J.B. "Principles of Seed Pathology". Vols. I and II, CBS Publ, 1993
- 2) Agrawal, "Seed Technology". Edition, reprint, revised; Publisher, Oxford and IBH Publishing, 2018
- 3) Hutchins, J.D., Reeves, J. E. "Seed Health Testing: Progress Towards the 21st Century". CABI, Wallington, 1997
- 4) Joshi, A.K., Singh, B.D. "Seed Science and Technology". Kalyani Publishers 2017
- 5) Khan, A.A. "Physiology and biochemistry of seed dormancy and germination". (Netherland, Amsterdam), 2016
- 6) Singh, B.D. "Plant Breeding Principles and Methodology". Kalyani Publishers, 2018
- 7) Agarwal, R.L. "Seed Technology". Oxford and IBHJ Publication, 1995

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 marks):

- Journal: 10 Marks
- Students Performance: 10 Marks

End Semester Examination (30 Marks):

- 4 questions



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Board of Studies in Botany

Programme: B. Sc.

Semester - III

Type: DSC V (Minor I)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course: BSTT 234: Principles of Seed Pathology (Minor-I)

Course Objectives:

By the end of the course, students will be able to:

- 1) Remember students with major seed-borne pathogens of agricultural importance.
- 2) Explain the mechanisms of seed infection, disease transmission, and host-pathogen interactions.
- 3) Apply basic techniques for seed disinfection and disease prevention.
- 4) Develop students' ability to diagnose seed-borne diseases and distinguish them from other seed quality issues.

Course Outcomes:

By the end of the course, students should be able to:

- 1) Define key terms related to seed pathology including seed-borne diseases, transmission, inoculum, and seed sanitation.
- 2) Apply standard seed health testing methods (e.g., blotter method, agar plate method) for detection of seed-borne pathogens.
- 3) Evaluate the effectiveness of physical, chemical, and biological methods used in seed disease management.
- 4) Analyze the epidemiology of seed-borne diseases under different environmental conditions

Module	Title and Contents	Hrs.
Module -1:	Module -1: Seed borne diseases 1.1 History of seed pathology 1.2 Economic significance of seed borne diseases. 1.3 Inoculum density of seed borne pathogens and its relationship with disease security, yield losses. 1.4 Ecological relationship of seed borne microorganisms	08
Module -2:	Module -2: Seed infection 2.1 . Fungal pathogens in stored seeds and their impact on animal and human health. (Suitable examples) 2.2 Mechanisms of transmission of seed pathogen. 2.3 Entry points of seed infection. 2.4 Influence of environmental factors on seed borne diseases	07

Module -3:	Module-3: Seed treatment 3.1 Seed treatment: Concept, procedures. 3.2 importance and equipments (any four). 3.3 Seed Health Testing: Objectives 3.4 procedures of sampling methods of seed health testing	08
Module -4:	Module-4: Seed Legislation 4.1 Quarantine for seed. (Principle and procedure) 4.2 Seed certification and tolerance limits of seed borne pathogens. 4.3 Seed act in relation to seed borne diseases. 4.4 Seed legislation at utilization.	07
Reference Books: - 1) Agarwal, R.N. “Seed Technology”. Publisher, Oxford, and IBH Publishing, 1982 2) Agarwal, V.K., Sinclair, J.B. “Principles of Seed Pathology”. CBS Publ., New Delhi, 1993 3) Agrawal, “Seed Technology”. Oxford and IBH Publishing Company Pvt. Limited; ISBN, 2018 4) Chopra, V.L. “Plant Breeding Field crops”. Oxford IBH Pvt. Ltd. New Dehli., 2001 5) Hutchins, J.D., Reeves, J.E. “Seed Health Testing: Progress Towards the 21 st Century”. CABI, Wallington, 1997 6) Paul, N. “Seed Pathology”. MacMillan, London, 1988 7) Suryanarayana, D. “Seed Pathology”. Vikash Publ., New Delhi, 1978		
Evaluation Pattern:		
Total Marks: 50		
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Board of Studies in Botany

Programme: B. Sc.

Semester - III

Type: DSC VI (Minor II)

Marks:50

Credits: 2

From: A. Y. 2025-26

Name of the Course: BSTT 235: Seed Production, Processing and Storage (Minor-II)

Course Objectives:

By the end of the course, students will be able to:

- 1) Introduce basic concepts, terminology, and classifications related to seed production, processing, and storage.
- 2) Describe the physiological and environmental factors influencing seed quality, processing, and storage.
- 3) Apply appropriate processing techniques such as drying, cleaning, grading, and packaging.
- 4) Assess seed quality through laboratory tests and field inspections, considering national standards.

Course Outcomes:

By the end of the course, students will be able to:

- 1) Identify the classes of seed and the requirements for certified seed production.
- 2) Describe the physiological and physical changes occurring during seed development and post-harvest handling.
- 3) Operate seed processing equipment such as seed cleaners, graders, and treaters.
- 4) Evaluate seed lots based on physical purity, moisture content, and germination standards as per certification norms.

Module	Title and Contents	Hrs.
Module -1:	1.1 Common cereals (rice, wheat and maize), important varieties, selection of land, isolation distance. 1.2 Agronomic practices, rouging, harvesting and seed yield. 1.3 Common pulses (lentil, chickpea, green gram, black gram, etc.), 1.4 important varieties, selection of land, isolation distance and inoculation, agronomic practices, rouging, harvesting and seed yield.	08
Module -2:	Module -2: Seed Processing 2.1 Principles of seed processing. 2.2 Methods and techniques of seed production in some agriculture crops-. crop (Rice). 2.3 Methods and techniques of seed production in some horticultural, maize, pea, brinjal).	07

	2.4 Seed multiplication and post-harvest handling of seeds.	
Module -3:	Module-3: Seed Cleaning Equipments 3.1 Seed treatments- methods of seed treatment 3.2 Seed treating formulations and equipment's. 3.3 Seed cleaning equipment and their functions, preparing seed for processing; functions of scalper debearder, scarifier, huller, seed cleaner and grader. 3.4 Screen cleaners, specific gravity separator, indented cylinder, velvet- spiral-disc separators, colour sorter, delinting machines; seed blending.	08
Module -4:	Module-4: Seed Packing and Seed Storage 4.1 Seed packaging: Principles, practices and materials; bagging and labeling. 4.2 Seed storage: Storage types with relation to the time, moisture and humidity. 4.3 Cryopreservation: Methods to minimize the loss of seed vigor and viability; factors influencing storage losses. Storage methods and godown sanitation. 4.4 Storage structures: Storage problems of recalcitrant and orthodox seeds and their conservation.	07
Reference Books: - 1) Agarwal, R.L. "Seed Technology". Oxford & IBH Publ. Co. Daryaganj, New Delhi, 1997 2) Agrawal, P.K., Dadlani, M. "Techniques: In Seed Science and Technology (2 nd Ed.)" 2014. 3) Baill, R.G., Alvin, G. Law, S.S. Virde Balis, JS. "Seed Processing". Cooperatively published by NSC, New Delhi, 2015 4) McDonald, M.B. Jr., Copeland, L.O. "Seed Production: Principles and Practices". Chapman & Hall, 1997		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20Marks): • CCE-I: Home Assignment: 10 Marks • CCE-II: Short and long answer questions Test/ Seminar/Open Book Test/Quiz/Case study/ Book review/Field work/ Industry visit: 10 Marks • CCE-III: MCQ Test :10 Marks • Note: Internal evaluation (Best of two CCE Marks will be considered)		End Semester Examination (30Marks): • Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M • Note: Conversion of 50 marks of ESE to 30 marks



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Faculty of Science and Technology

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Board of Studies in Botany

Programme: B. Sc.

Semester - III

Type: DSC P (Minor Practical)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course: Practical Course-BSTP 236 (Practicals based on Theory Courses BSTT 234 & 235) (Minor-Practical)

Course Objectives:

By the end of the course, students will be able to:

- 1) Introduce fundamental concepts, terminology, and classifications related to seed pathology, seed production systems, processing techniques, and storage practices.
- 2) Explain the principles and mechanisms of seed infection, disease transmission, and their effects on seed viability and crop productivity.
- 3) Apply appropriate processing techniques such as cleaning, drying, grading, treating, and packaging for maintaining seed quality.
- 4) Assess seed lots using quality parameters including purity, viability, moisture, and germination standards.

Course Outcomes:

By the end of the course, students will be able to:

- 1) Identify common seed-borne pathogens and the major stages in seed production and processing.
- 2) Describe the principles of genetic purity, seed certification, and physiological processes during seed development and storage.
- 3) Operate seed production and processing equipment and implement practices for maintaining seed quality during handling.
- 4) Evaluate the effectiveness of seed treatments and disease management strategies on maintaining seed viability and purity.

Practical No.	Title and Contents (Any 15 of the following)	Hrs.
1	Study of seed certification agency.	4
2	Study of plant-originated insecticides.	4
3	Preparation of PDA culture media.	4
4	Isolation and identification of seed-borne fungi.	4
5	Study of seed viability testing.	4
6	Visits to regulatory seed testing laboratory.	4
7	Visit to plant quarantine lab.	4
8	Detection of seed-borne bacterial and viral disease.	4
9	Study of chemical methods to control seed-borne pathogens.	4
10	Study of seeds of different varieties of common crops Selection of season, area and land, varieties, etc.	4

11	Demonstrate land preparation, isolation distance, sowing techniques, seed treatment, fertilizer application, weed control, water management, rouging, harvesting and threshing of at least one crop from each group of cereals, pulses, and vegetable crops	4
12	Follow inspection in seed production fields, and conduct sampling as per certification standards.	4
13	Different methods of examination of seeds to assess seed-borne microorganisms and to quantify infection percentage.	4
14	Study of various seed treatment methods.	4
15	Study of traditional and advanced storage methods of seeds.	4
16	Study of seed cleaning equipment's.	4

Reference Books:

- 1) Agarwal, R.N. "Seed Technology". Publisher, Oxford, and IBH Publishing, 1982
- 2) Agarwal, V.K., Sinclair, J.B. "Principles of Seed Pathology". CBS Publ., New Delhi 2018
- 3) Chopra, V.L. "Plant Breeding Field crops". Oxford IBH Pvt. Ltd. New Dehli, 2001
- 4) Hutchins, J.D., Reeves, J.E. "Seed Health Testing: Progress Towards the 21st Century". CABI, Wallington, 1997
- 5) Paul, N. "Seed Pathology". MacMillan, London, 1988
- 6) Suryanarayana, D. "Seed Pathology". Vikash Publ., New Delhi. 1978

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 marks):

- Journal: 10 Marks
- Students Performance: 10 Marks

End Semester Examination (30 Marks):

- 4 questions



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Botany

Programme: B. Sc.

Semester - III

Type: VSC-I

Marks: 50

Credits: 02

From: A. Y. 2025-26

Name of the Course: Vocational Skill Course (BSTPVSC-I): Advanced Skills in Seed Technology

Course Objectives:

By the end of the course, students will be able to:

- 1) Remember advanced terminology, standards, and classifications in seed science and technology.
- 2) Explain the principles behind advanced seed testing methods, seed enhancement technologies, and certification systems.
- 3) Apply seed viability test.
- 4) Understand the techniques for cryopreservation (freezing seeds for long-term storage).

Course Outcomes:

By the end of the course, students will be able to:

- 1) Perform encapsulation of artificial endosperm.
- 2) Got the basic knowledge of biological seed treatment.
- 3) Perform the agronomic management, rouging, harvesting threshing.
- 4) Understand structure of monocot and dicot embryos.

Practical No.	Title and Contents	Hrs.
1	Study of external and internal structure of monocot and dicot seeds.	4
2	Study of monocot and dicot embryos.	4
3	Study of Seed-coat: its structure, texture in relation to permeability, imbibition of water.	4
4	Hands-on practice in hybrid seed production techniques (controlled pollination, emasculation).	4
5	Study of breaking of seed dormancy by chemical treatment.	4
6	Study of seed viability tests (TTC).	4
7	Study of aging tests of seeds to assess seed vigor.	4
8	Study of methods for hydrogel encapsulation of artificial endosperm, hydrophobic coating.	
9	Study of agronomic management, rouging, harvesting threshing.	4
10	Study of seed cleaning instruments (air-screen cleaners, specific gravity separators).	4
11	Study of seed cleaning instruments (magnetic separators, and electronic separators).	4

12	Study of biological seed treatments (Bio pesticides).	4
13	Study of techniques for cryopreservation (freezing seeds for long- term storage).	4
14	Evaluating seed viability post-cryopreservation.	4
15	Visit to seed and fertilizers market.	4

Reference Books:

- 1) Bhojwani, S.S., Bhatnagar, S.P. “Embryology of Angiosperms”. New Delhi: Vikas Publishing Pvt. Ltd., 1999
- 2) Joshi, A.K., Singh, B.D. “Seed Science and Technology”. New Delhi: KalyaniPublishers, 2017
- 3) Khan, A.A. “Physiology and Biochemistry of Seed Dormancy and Germination”. North Holland, Amsterdam, 1977.
- 4) Mondal, S.S. “Seed Production of field crops”. New Delhi: New India Publishers Agency, 2009
- 5) Singh, B. D. “PlantBreeding: Principlesand Methodology”. New Delhi: KalyaniPublishers, 2018.

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 marks):

- Journal: 10 Marks
- Students Performance: 10 Marks

End Semester Examination (30 Marks):

- 4 questions



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Botany

Programme: B. Sc.

Semester - III

Type: SEC-I Practical

Marks: 50

Credits: 02

From: A. Y. 2025-26

Name of the Course: Skill Enhancement Course (BSTPSEC-I): Seed Illustrations and Photography

Course Objectives:

By the end of the course, students will be able to:

1. Understand the fundamentals of photography and its significance.
2. Identify the equipment required for effective photography.
3. Understand copyright issues and legal aspects related to photography.
4. Develop photography skills, incorporating scientific perception and attention to detail

Course Outcomes:

By the end of the course, students will be able to:

1. Recognize the different equipment required for photography.
2. Capture photographs of plants both in the laboratory and in the field from a scientific perspective.
3. Conduct photography sessions of plants with professional skill and finesse.
4. Comprehend and apply copyright regulations when taking photographs of plants.

Practical No.	Title and Contents (Any 15 of the following)	Hrs.
1	Study of habit of Plants.	4
2	Study of various leaf shapes, margins, and venation patterns.	4
3	Morphological study of complete flower.	4
4	Study of different types of fruits and seeds.	4
5	Comparative study of plant species using both drawings and photos.	4
6	Study of types of camera and accessories.	4
7	Study of photography and its types.	4
8	Study of Indoor and Outdoor Photo Shoots.	
9	Study of image processing using AI.	4
10	Study of Light and shadow as requirements in photography.	4
11	Study of color and Black & White Photography.	4
12	Demonstration of photoshop software.	4
13	Study of Digital Photography.	4
14	Study of Processing of digital photographs.	4

15	Study of Macrophotography.	4
16	Study of Microphotography.	4
17	Study of Labelling of Photographs.	4
18	Ethics in photography and nature photography.	4
19	Preparation of exhibition of botanical illustrations and photographs.	4

Reference Books:

- 1) Broll, B. "Microcosmos: Discovering the World through Microscopic Images from 20 X to Over 20 Million X Magnification". Firefly books, 2010
- 2) Gerlach, J., Gerlach, B. "Digital Wildlife Photography". Focal Press, Taylor and Francis Group. 2013
- 3) Harnischmacher, C. "Complete guide to Macro and Close-up Photography". Rocky Nook, 2016
- 4) Saikia, N. "Art and Indian Copyright Law- A statutory Reading". 2015
- 5) Shaw, J. "Nature Photography Field Guide". Amphoto Books, Crown Publishing Group, New York, 2000

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 marks):

- Journal: 10 Marks
- Students Performance: 10 Marks

End Semester Examination (30 Marks):

- 4 questions

	Karmaveer Bhaurao Patil University, Satara (A State Public University Est. u/s 3(6) of MPUA 2016) Faculty of Science and Technology	
	Yashavantrao Chavan Institute of Science, Satara	
	Board of Studies in Botany	
	Programme: B. Sc.	Semester - III
	Type: IKS 2	Marks: 50
	Credits: 02	From: A. Y. 2025-26
Name of the Course: BSTT IKS 2: Indian Agriculture		
Course Objectives: By the end of the course, students will be able to: 1) Impart knowledge of traditional agricultural practices followed in India. 2) Develop awareness about the glorious history of Indian agriculture. 3) Make the students knowledgeable about ancient agricultural techniques. 4) Empower the students with the ability to compare ancient, medieval, and modern agriculture trends.		
Course Outcomes: By the end of the course, students will be able to: 1) Tell about ancient Indian agriculture and compare the different ancient agriculture traditions with the current scenario. 2) Explain the irrigation techniques in India and demonstrate the various irrigation techniques followed in India. 3) Evaluate the effectiveness of different agriculture technologies implemented in India. 4) Compare the Indian attitude towards agriculture during the history of India.		
Module	Title and Contents	Hrs.
Module -1:	Module -1 History of Indian Agriculture 1.1 Introduction and importance of Agriculture in India 1.2 History of Indian agriculture: 1.3 The significance of agriculture and irrigation as emphasized in the Indian Mythological texts like Ramayana, Mahabharata and other. 1.4 Mention of Indian agriculture by Greek historians and later travelers	07
Module -2:	Module -2: Ancient Irrigation Techniques 2.1 Significance of Agriculture and irrigation for the Kings of Indian tradition. 2.2 Major water bodies of ancient times. 2.3 The Ery system of south India Significance of Agriculture and irrigation for the Kings of Indian tradition. 2.4 Major water bodies of ancient times. The Ery system of south India	08

Module -3:	Module -3: Indian Agriculture Technologies 3.1 Excellence of Indian agricultural technologies as observed by more recent European observers. 3.2 Productivity of Indian agriculture in medieval Thanjavur and eighteenth-century Allahabad, Chengalpattu, etc	07
Module -4:	Module -4: Agriculture and Indian Society 4.1 Indian attitude towards agriculture in ancient times. 4.2 Indian attitude towards agriculture in medieval times. Indian attitude towards agriculture in modern times	08

Reference Books:

- 1) Agarwal, A., Narain, S. "Dying Wisdom: Rise, Fall and Potential of India Traditional Water- Harvesting Systems". Centre for Science and Environment, New Delhi, 1997
- 2) Basu, R.N., Bose, T.K., Chakraborty, C.S. "History of Science in India - Agricultural Science (Volume V)". The National Academy of Science, India (NASI) & The Ramakrishna Mission Institute of Culture, India, 2017
- 3) Srinivasan, T.M. "Irrigation and Water Supply: South India, 200 BC to 1600 AD." South Asia Books, Hyderabad, 1991
- 4) Mukundan, T.M. "The Ery Systems of South India". Akash Ganga Trust, Chennai. 2005
- 5) Bunce, F.W.D.K. "The Iconography of Water: Well and Tank Forms of the Indian Subcontinent". Printworld Pvt. Ltd., New Delhi, 2013
- 6) Chakravarty, K.K., Badam, G.L., Paranjpye, V. "Traditional Water Management Systems of India". Aryan Books International, New Delhi, 2006
- 7) Bhadani, B.L. "Water Harvesting, Conservation and Irrigation in Mewar (AD 800-1700)". Manohar Publishers & Distributors, New Delhi, 2012

Evaluation Pattern:

Total Marks: 50

Internal Continuous Evaluation (20Marks): • CCE-1: Home Assignment: 10 Marks • CCE-II: Short and long answer questions Test/ Seminar/Open Book Test/Quiz/Case study/ Book review/Field work/ Industry visit: 10 Marks • CCE-III: MCQ Test :10 Marks • Note: Internal evaluation (Best of two CCE Marks will be considered)	End Semester Examination (30Marks): • Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M • Note: Conversion of 50 marks of ESE to 30 marks
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Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Botany

Programme: B. Sc.

Semester - IV

Type: DSC VII (Major III)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course: BSTT 241: Recent Trends in Plant Breeding (Major-III)

Course Objectives:

By the end of the course, students will be able to:

- 1) Apply plant breeding techniques for crop improvement by integrating genetic principles with modern biotechnological approaches.
- 2) Analyze the impact of recent technologies on breeding efficiency, genetic gain, and crop adaptability.
- 3) Evaluate case studies on the successful application of advanced breeding strategies in major crops.
- 4) Design modern breeding programs incorporating both classical and molecular approaches.

Course Outcomes:

By the end of the course, students should be able to:

- 1) Explain the principles and methodologies behind molecular breeding, genomic selection, and biotechnological advancements.
- 2) Analyze differences between conventional and molecular breeding strategies in terms of efficiency, cost, and genetic gain.
- 3) Evaluate the effectiveness of recent breeding technologies in addressing current agricultural challenges such as climate change, disease resistance, and nutritional enhancement.
- 4) Design a modern breeding program for a selected crop using integrated approaches (classical + molecular).

Module	Title and Contents	Hrs.
Module -1:	Module -1: Heterosis and inbreeding depression 1.1 Heterosis: Introduction, Genetic basis and Types 1.2 Commercial exploitation of heterosis 1.3 Introduction of inbreeding depression 1.4 Genetic basis of inbreeding depression Commercial utilization	07
Module -2:	Module -2: Male sterility 2.1 Male Sterility: Definition, 2.2 Types-GMS, CMS, C-GMS 2.3 Environmental sterility 2.4 Application of male sterility	08

Module -3:	Module -3: Self-incompatibility 3.1 Definition, genetic basis of self-incompatibility, 3.2 Types of incompatibility. 3.3 Merits and demerits. 3.4 Methods of breaking incompatibility (pollen irradiation, application of NAA and IAA).	07
Module -4:	Module -4: Biotechnological applications 4.1 Haploid production 4.2 Somaclonal variation 4.3 Embryo rescue 4.4 Synthetic seed production and cybrids	08
Reference Books: - 1) Chawla, H.S. “Plant Biotechnology”. Theory and Practice, 2011. 2) Chopra, L. “Plant Breeding of Field Crops”. Oxford IBH Pvt. Ltd. New Dehli, 2001 3) Singh, B.D. “Plant Biotechnology”. Kalyani Publ.2010 4) Singh, P. A. “Vegetable breeding and seed production”. Kalyani Publ. Ludhiana, 2009 5) Singh, B.D. “Plant Breeding”. 2 nd Ed. Kalyani Publ. Ludhiana, 2006		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20Marks): • CCE-I: Home Assignment: 10 Marks • CCE-II: Short and long answer questions Test/ Seminar/Open Book Test/Quiz/Case study/ Book review/Field work/ Industry visit: 10 Marks • CCE-III: MCQ Test :10 Marks • Note: Internal evaluation (Best of two CCE Marks will be considered)		End Semester Examination (30Marks): • Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M • Note: Conversion of 50 marks of ESE to 30 marks



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Botany

Programme: B. Sc.

Semester - IV

Type: DSC VIII (Major IV)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course: BSTT 242: Seed Farm Management and Marketing (Major-IV)

Course Objectives:

By the end of the course, students will be able to:

- 1) Apply marketing mix elements (product, price, place, promotion) in real-world seed marketing scenarios.
- 2) Develop knowledge of seed certification, quality standards, and storage practices.
- 3) Analyze the factors affecting seed farm profitability, including input costs, labor management, and market access.
- 4) Assess the economic feasibility of seed production enterprises and marketing strategies.

Course Outcomes:

By the end of the course, students should be able to:

- 1) Explain the fundamentals of seed farm planning, management practices, and resource allocation.
- 2) Describe the concepts of seed demand forecasting, pricing strategies, and market segmentation.
- 3) Implement marketing mix strategies (product, price, place, promotion) in seed marketing scenarios.
- 4) Examine market trends, customer behavior, and distribution channels in the seed industry.

Module	Title and Contents:	Hrs.
Module -1:	Module-1: Introduction to Seed Farm Management. 1.1 Seed Farming: Definition and Importance 1.2 Seed Farms: Types (Public, Private, Cooperative) 1.3 Overview of Seed Supply Chains 1.4 Basic Principles of Farm Management	07
Module -2:	Module -2: Seed Production Techniques 2.1 Principles of Seed Production 2.2 Genetic Purity and Quality Assurance 2.3 Isolation Requirements for Different Crops 2.4 Seed Multiplication Systems	08

Module -3:	Module -3: Seed Processing and Storage 3.1 Seed Cleaning and Grading 3.2 Seed Treatment and Packaging 3.3 Storage Techniques and Management 3.4 Handling Seed Deterioration and Loss	07
Module -4:	Module -4: Marketing and Distribution of Seeds 4.1 Market Analysis and Demand Forecasting 4.2 Marketing Channels for Seed Distribution 4.3 Digital Platforms in Seed Marketing Agri-Business Models in Seed Sector	08
Reference Books: - 1) Bordolui, S.K., Chatterjee, S. “Seed Marketing: Channel and Distribution System”. Agrobios Research, 2021. 2) Kush, B., Sharma, P., Nelson, R., Thakur, S., Wasnik S.B. “Agribusiness Management”. Taylor & Francis Ltd, 2024. 3) Mondal, S.S., Saha, M., Sengupta, K., Banerjee, H. “Seed Production of Field Crops: 2nd Fully Revised and Enlarged Edition”. NIPA, 2023. 4) Sharma, A.K., Gaur, R.K. “Seed Technology: Principles and Practices”. Kalyani Publishers, 2021.		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20Marks): • CCE-1: Home Assignment: 10 Marks • CCE-II: Short and long answer questions Test/ Seminar/Open Book Test/Quiz/Case study/ Book review/Field work/ Industry visit: 10 Marks • CCE-III: MCQ Test :10 Marks • Note: Internal evaluation (Best of two CCE Marks will be considered)	End Semester Examination (30Marks): • Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M • Note: Conversion of 50 marks of ESE to 30 marks	



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Botany

Programme: B. Sc.

Semester - IV

Type: DSC P (Major Practical)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course: Practical Course (BSTP 243): (Practicals based on theory Course BSTT 241 & 242) (Major-Practical)

Course Objectives:

By the end of the course, students will be able to:

- 1) Analyze the effectiveness of recent breeding methods in improving genetic gain and stress tolerance.
- 2) Apply management and marketing strategies in planning seed production and business operations.
- 3) Evaluate breeding programs and seed farm enterprises for scientific efficiency, commercial viability, and sustainability.
- 4) Develop business models and marketing plans for profitable and scalable seed production ventures.

Course Outcomes:

By the end of the course, students should be able to:

- 1) Recall advanced concepts and terminology related to modern plant breeding tools, seed production systems, and marketing strategies.
- 2) Understand the techniques of sterilization.
- 3) Prepare the strategies for seed farms.
- 4) Perform seed testing and certification.

Practical No.	Title and Contents (Any 15 of the following)	Hrs.
1.	Study of breeder's kit.	04
2.	Emasculation of various crops (Maize, Cotton, Wheat).	04
3.	Studies of protogynous and protandrous flowers in Jowar and sunflower.	04
4.	Study of pollen viability.	04
5.	Study of structure of pollen grain.	04
6.	Study of pollen germination.	04
7.	Preparation of culture medium (M.S.).	04
8.	Study of sterilization techniques.	04
9.	Demonstration of GM crops using suitable example (BT Cotton).	04

10.	Seed bed Preparation and Sowing Techniques.	04
11.	Seed Planting and Maintenance Practices.	04
12.	Seed Testing and Certification Processes.	04
13.	Soil Fertility Management in Seed Farms.	04
14.	Sustainable Practices in Seed Farm Management.	04
15.	Economic Management and Budgeting for Seed Farms.	04
16.	Marketing and Distribution Strategies for Seed Farms.	04
17.	Advanced Technologies in Seed Production.	04
18.	Climate Adaptation Strategies for Seed Farm Management.	04
19.	Business Planning and Risk Management in Seed Farms.	04

Reference Books: -

- 1) Bhojwani, S.S., Dantu, P. "Plant Tissue Culture – An Introductory Text". Springer Publications, 2013
- 2) Gamborg, O.L., Philips, G.C. (eds.) "Plant Cell, Tissue and Organ culture Lab Manual". Springer Science & Business media, 2013
- 3) Herman, E.B. "Media and Techniques for Growth, Regeneration and Storage". Agritech Publications, New York, USA, 2008
- 4) ICAR, "Handbook of Agriculture" 6th ed. New Delhi Indian Council of Agricultural Research, 2017
- 5) Joshi, A.K., Singh, B.D. "Seed Science and Technology". New Delhi Kalyani Publishers, 2005
- 6) Khare, D., Bhale, M.S. "Seed Technology". 2nd ed. Jodhpur Scientific Publisher, 2014
- 7) Razdan, M.K. "Introduction to plant tissue culture". 2nd edition, Oxford publications group, 2000.

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 marks):

- Journal: 10 Marks
- Students Performance: 10 Marks

End Semester Examination (30 Marks):

- 4 questions
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Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Botany

Programme: B. Sc. II

Semester - IV

Type: DSC VII (Minor III)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course: BSTT 244: Techniques to Improve Seed Production (Minor-III)

Course Objectives: By the end of the course, students will be able to

- 1) Introduce the basic and advanced concepts of seed production, including seed classes, crop-specific requirements, and purity standards.
- 2) Describe the importance of isolation, roguing, pollination control, and maintenance of genetic purity in seed production.
- 3) Apply field layout, irrigation, fertilization, pest control, and harvesting practices that optimize seed performance.
- 4) Analyze the role of various production techniques (e.g., use of male sterility, growth regulators, and precision farming) in improving seed yield and quality.

Course Outcomes:

By the end of the course, students should be able to:

- 1) Recall the stages and principles involved in seed production.
- 2) Apply proper field layout and agronomic practices to ensure high-quality seed production.
- 3) Analyze the causes of genetic and physical contamination in seed production fields.
- 4) Design a seed production protocol tailored to a specific crop and agro-climatic zone.

Module	Title and Contents	Hrs
Module -1:	Module -1: Importance of Seed 1.1 Introduction: Seed as basic input in agriculture; seed development in cultivated plants; seed quality concept and importance of genetic purity in seed production; 1.2 Types of cultivars, their maintenance and factors responsible for deterioration, seed production in self- and cross-pollinated crops. 1.3 Planning of seed production for different classes of seeds for self- and cross-pollinated crops, seed quality control system and organization, seed village concept; 1.4 Seed production agencies, seed industry and custom seed production in India	07
Module -2:	Module -2: Principles of Hybrid Seed Production 2.1 Mode of pollination and reproduction in crop plants and their modification in relation to hybrid seed production. 2.2 Principles of hybrid seed production, isolation distance,	08

	synchronization of flowering, rouging etc. 2.3 Male sterility and incompatibility system in hybrid seed production. 2.4 Role of pollinators and their management	
Module -3:	Module -3: Seed Multiplication and Propagation 3.1 Seed multiplication ratios, seed replacement rate, demand and supply. 3.2 Suitable areas of seed production and storage, agronomy of seed production – agro climatic requirements and their influence on quality seed production. 3.3 Seed – criteria involved; life span of a variety and causes for its deterioration. 3.4 Certification standards for self and cross pollinated and vegetatively propagated crops.	07
Module -4:	Module -4: Hybrid Seeds 1.1 Hybrid Seed – Methods of development of hybrids. 1.2 Use of male sterility and self-incompatibility in hybrid seed production. 1.3 One, two and three-line system; maintenance of parental lines of hybrids. Planning and management of hybrid seed production technology of major field crops and vegetables.	08
Reference Books: - 1) Agarwal, R.L. “Seed Technology”. 2nd Ed. Oxford & IBH, 1997 2) Chapman and Hall. Musil A.F. “Identification of Crop and Weed Seeds”. Handbook No. 219, USDA, Washington, DC, USA, 1967 3) Chhabra, A.K. “Practical Manual of Floral Biology of Crop Plants”. Dept. of Plant Breeding CCS HAU, Hisar, 2006 4) Desai, B.B. “Seeds Handbook”. Marcel Dekker, 2004		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20Marks): • CCE-I: Home Assignment: 10 Marks • CCE-II: Short and long answer questions Test/ Seminar/Open Book Test/Quiz/Case study/ Book review/Field work/ Industry visit: 10 Marks • CCE-III: MCQ Test :10 Marks • Note: Internal evaluation (Best of two CCE Marks will be considered)		End Semester Examination (30Marks): • Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M • Note: Conversion of 50 marks of ESE to 30 marks



Karmaveer Bhaurao Patil University, Satara

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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Botany

Programme: B. Sc.

Semester - IV

Type: DSC VIII (Minor IV)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course: BSTT 245: Seed Quality (Minor-IV)

Course Objectives:

By the end of the course, students will be able to:

- 1) Define key terms related to seed quality (e.g., viability, vigor, purity).
- 2) Explain the significance of seed quality in crop production.
- 3) Demonstrate proper seed sampling techniques.
- 4) Propose improvements to an existing seed testing laboratory setup.

Course Outcomes: By the end of the course, students should be able to:

- 1) Perform standard seed quality tests such as germination, moisture content, and purity tests.
- 2) Compare and contrast different seed storage and treatment methods based on quality outcomes.
- 3) Evaluate the effectiveness of different seed processing techniques on seed quality parameters
- 4) Develop a standard operating procedure (SOP) for seed testing in a laboratory.

Module	Title and Contents	Hrs.
Module -1:	Module -1: Seed Quality Control Introduction: Structure of monocot and dicot seeds; 1.1 Seed quality: objectives, concept and components and their role in seed quality control; 1.2 Instruments, devices and tools used in seed testing. 1.3 ISTA and its role in seed testing	07
Module -2:	Module -2: Seed Sampling 2.1 Seed Sampling: definition, objectives, seed-lot and its size. 2.2 Types of samples: sampling devices; procedure of seed sampling; sampling intensity; 2.3 Methods of preparing composite and submitted samples; sub-sampling techniques, dispatch, receipt and registration of submitted sample in the laboratory, 2.4 Sampling in the seed testing laboratory.	08

Module -3:	Module -3: Seed Germination Testing 3.1 Germination: importance; definitions; requirements for germination, instrument and substrata required; 3.2 Principle and methods of seed germination testing; working sample and choice of method 3.3 General procedure for each type of method; duration of test; seedling evaluation; calculation and reporting of results; 3.4 Dormancy: definition, importance, causal mechanisms, types and methods for breaking dormancy	07
Module -4:	Module -4 Viability and Vigour Testing 1.1 Viability and vigour testing: definition and importance of viability tests; 1.2 Different viability tests; quick viability test (TZ- test) - advantages, principle, preparation of seeds and solutions, procedure, evaluation and calculation of test results. 1.3 Vigour testing: concept, historical development, definitions. 1.4 Principles and procedures of different methods used for testing vigour	08
Reference Books: - 1) Joshi, A.K., Singh, B.D. "Seed Science and Technology". New Delhi: Kalyani Publishers, 2017 2) Khan, A.A. "Physiology and Biochemistry of Seed Dormancy and Germination". North Holland, Amsterdam, 1977 3) Mondal, S.S. "Seed Production of field crops". New Delhi: New India Publishers Agency, 2009 4) Singh, B.D. "Plant Breeding: Principles and Methodology". New Delhi: Kalyani Publishers, 2018		
Evaluation Pattern:		
Total Marks: 50		
Internal Continuous Evaluation (20 Marks): • CCE-I: Home Assignment: 10 Marks • CCE-II: Short and long answer questions Test/ Seminar/Open Book Test/Quiz/Case study/ Book review/Field work/ Industry visit: 10 Marks • CCE-III: MCQ Test :10 Marks • Note: Internal evaluation (Best of two CCE Marks will be considered)		End Semester Examination (30 Marks): • Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10 marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M • Note: Conversion of 50 marks of ESE to 30 marks



Karmaveer Bhaurao Patil University, Satara

(A State Public University Est. u/s 3(6) of MPUA 2016)

Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Botany

Programme: B. Sc.

Semester - IV

Type: DSC P (Minor Practical)

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course: Practical Course (BSTP 246): (Practicals based on theory Course BSTT 244 & 245) (Minor-Practical)

Course Objectives: By the end of the course, students will be able to:

- 1) Identify the basic concepts and terminologies related to seed production and quality.
- 2) Describe the principles of seed production in different crop types (self-pollinated, cross-pollinated, and hybrids).
- 3) Analyze the effects of field management practices on seed quality.
- 4) Develop innovative strategies for improving seed vigor and shelf life.

Course Outcomes:

By the end of the course, students should be able to:

- 1) Define key terms related to seed production and quality (e.g., genetic purity, seed vigor, isolation distance).
- 2) Describe the biological and environmental factors affecting seed production.
- 3) Implement seed sampling, processing, and storage methods to maintain quality.
- 4) Propose a sustainable model for commercial seed production and quality assurance.

Practical No.	Title and Contents(Any 15 of the following)	Hrs
1.	Selection of suitable areas/locations for high quality seed/planting material production.	4
2.	Study of floral biology of vegetables.	4
3.	Determination of planting ratios for hybrid seed production vegetables.	4
4.	Use and maintenance of monoecious line in hybrid seed production of cucumber.	4
5.	Exercises on emasculation and pollination.	4
6.	Seed extraction methods and their effect on quality of vegetables.	4
7.	Seed production technology of varieties and hybrids in vegetables.	4
8.	Planning of Seed Production, requirements for different classes of seeds in field crops - unit area and rate.	4
9.	Seed production in cross pollinated crops with special reference to land, isolation, planting ratio.	4
10.	Pollination in Cotton, detasseling in Corn.	4
11.	Pollen collection, storage, viability and stigma receptivity.	4
12.	Study of seed germination.	4

13.	Study of methods to break seed dormancy.	4
14.	Study of instruments used for seed testing.	4
15.	Effects of priming; methods for hydrogel encapsulation of artificial endosperm, hydrophobic coating.	4
16.	Visits to seed production plots.	4

Reference Books: -

- 1) Chapman, and Hall, Singhal, N.C. “Hybrid Seed Production in Field Crops”. Kalyani, 2003
- 2) Desai, B.B. “Seeds Handbook”. Marcel Dekker, 2004
- 3) George, R.A.T. “Vegetable Seed Technology”. A Technical Guide to Vegetable Seed Production, Processing, Storage and Quality Control. FAO, Rome, 1980
- 4) Jeswani, L.M., Baldev, B. “Advances in pulse production technology”. ICAR, New Delhi, 1997
- 5) Kelly, A.F. “Seed Production of Agricultural Crops”. John Wiley, 1988
- 6) Kelly, A.F., George, R.A.T. (Eds.). “Encyclopedia of Seed Production of World Crops”. 1998
- 7) McDonald, M.B. Jr., Copeland, L.O. “Seed Production of Crops: Principles and Practices”. 1997
- 8) Salunkhe, D.K., Desai, B.B., Bhat, R.N. “Vegetable and Flower Seed Production”. Agricole Publ. Academy, 1987
- 9) Singh, S.P. “Seed Production of Commercial Vegetables”. Agrotech, 2001

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 marks):

- Journal: 10 Marks
- Students Performance: 10 Marks

End Semester Examination (30 Marks):

- 4 questions
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Faculty of Science and Technology

Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Botany

Programme: B. Sc. II

Semester - IV

Type: VSC II

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course: Vocational Skill Course (BSTPVSC-II): Advanced Skills in Seed Technology –II

Course Objectives:

By the end of the course, students will be able to:

- 1) List specialized equipment and technologies used in seed testing, processing, and enhancement.
- 2) Implement advanced protocols for seed storage and shelf-life extension.
- 3) Diagnose seed-borne diseases and determine their effect on seed viability and performance.
- 4) Formulate innovative strategies for climate-resilient and high-vigor seed production.

Course Outcomes:

By the end of the course, students should be able to:

- 1) Identify modern tools and equipment used in seed analysis, enhancement, and processing.
- 2) Interpret seed laboratory and field test data accurately.
- 3) Operate precision instruments for seed testing, grading, and enhancement.
- 4) Evaluate the performance and reliability of advanced seed testing tools and methods

Practical No.	Title and Contents (Any 15 of the following)	Hrs
1.	Study of germination percentage, root length, shoot length and root-shoot ratio of seedling.	04
2.	Study of fresh weight, dry weight and moisture content of seedling.	04
3.	Study of seed health testing (pathogen detection).	04
4.	Study of priming seeds for enhanced germination.	04
5.	Study of stratification of dormant seeds.	04
6.	Study of scarification of hard seeds for germination enhancement.	04
7.	Study of advanced seedling and nursery management	04
8.	Study of nutrient management in seedling nurseries.	04
9.	Study of pollination control in seed crops.	04
10.	Study of harvesting seeds at optimal maturity.	04
11.	Study of post-harvest seed handling.	04
12.	Study of seed storage and preservation	04
13.	Study of seed coating with fungicides or pesticides.	04
14.	Study of field evaluation of seed crops for quality.	04

15.	Study of seed coating with biofertilizers.	04
16.	Study of seed testing for hard-to-germinate species (Orchids, Palms).	04
17.	Seed testing for germination rate under variable temperatures.	04

Reference Books:

- 1) Desai, B.B. “Seeds Handbook”. Marcel Dekker, 2004
- 2) George, R.A.T. “Vegetable Seed Technology”. A Technical Guide to Vegetable Seed Production, Processing, Storage and Quality Control. FAO, Rome, 1980
- 3) ICAR, “Handbook of Agriculture”. 6th ed. New Delhi Indian Council of Agricultural Research, 2017
- 4) Jeswani, L.M., Baldev, B. “Advances in pulse production technology”. ICAR, New Delhi, 1997
- 5) Khare, D., Bhale, M.S. “Seed Technology”. 2nd ed. Jodhpur Scientific Publisher, 2014

Evaluation Pattern:

Total Marks: 50

Internal Evaluation (20 marks):

- Journal: 10 Marks
- Students Performance: 10 Marks

End Semester Examination (30 Marks):

- 4 questions



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Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Botany

Programme: B. Sc.

Semester -IV

Type: SEC-II Practical

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course: Skill Enhancement Course (BSTPSEC-II): Nursery Practices for Medicinal Plant

Course Objectives:

By the end of the course, students will be able to:

- 1) To understand the importance and scope of medicinal plant cultivation.
- 2) To learn identification, propagation, and cultivation techniques of key medicinal plants.
- 3) To study soil, climate, and ecological requirements for major species.
- 4) To apply sustainable and good agricultural practices (GACP).

Course Outcomes:

By the end of the course, students should be able to:

- 1) Identify and classify important medicinal and aromatic plants.
- 2) Apply scientific cultivation techniques for selected medicinal plant species.
- 3) Implement sustainable and good agricultural practices (GACP) in medicinal plant farming.
- 4) Carry out post-harvest processing, storage, and quality assessment of medicinal raw materials.

Practical No.	Title and Contents: (Any 15 of the following)	Hrs
1.	Study of nursery layout and site selection for medicinal plants.	04
2.	Study of nursery equipment and tools.	04
3.	Collection, processing, and storage of medicinal plant seeds.	04
4.	Study of seed treatment and breaking of seed dormancy.	04
5.	Study of seed sowing methods in medicinal plant nursery.	04
6.	Study of vegetative propagation methods (cuttings, suckers, rhizomes, tubers).	04
7.	Identification of common medicinal plants.	04
8.	Collection and herbarium preparation of medicinal species.	04
9.	Study of organic manures and biofertilizers in nursery	04
10.	Study of irrigation management in medicinal plant nursery.	04
11.	Identification and control of nursery pests and diseases.	
12.	Study of hardening and transplanting of nursery-raised medicinal seedlings.	
13.	Study of nursery record maintenance (germination %, survival rate, etc.).	
14.	Study of preparation of compost and vermicompost for nursery use.	
15.	Study of drying and storage of medicinal plant materials.	

16.	Economic analysis of cultivation and marketing.	
17.	Documentation of good agricultural practices.	
18.	Digital documentation and labelling.	
19.	Preparation of herbal formulations (Powder, Decoction, or Ointment)	
20.	Visit to a commercial medicinal plant nursery.	

Reference Books: -

- 1) Ganguli, P. "Intellectual Property Rights: Unleashing the Knowledge Economy". New Delhi: Tata McGraw-Hill, 2001
- 2) Kothari, C.R. "Research Methodology: Methods and Techniques". New Delhi: New Age International (P) Ltd. Publishers, 2004
- 3) Miller, A.R., Davis, M.H. "Intellectual Property: Patents, Trademarks and Copyright in a Nutshell". St. Paul, MN: West Group Publishers, 2000
- 4) Stapleton, P., Yondeowei, A., Mukanyange, J., H. Houten, H. Scientific Writing for Agricultural Research Scientists – A Training Reference Manual. Hong Kong: West Africa Rice Development Association, 1995

Evaluation Pattern:

Total Marks: 50	
Internal Evaluation (20 marks): • Journal: 10 Marks • Students Performance: 10 Marks	End Semester Examination (30 Marks): • 4 questions



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Yashavantrao Chavan Institute of Science, Satara

Board of Studies in Botany

Programme: B. Sc.

Semester - IV

Type: VEC II

Marks: 50

Credits: 2

From: A. Y. 2025-26

Name of the Course: Value Education Course (BSTTVEC-II): Environmental Studies in Seed Technology

Course Objectives:

By the end of the course, students will be able to:

- 1) Understand the environmental issues.
- 2) Relate that laws made to safeguard the environment.
- 3) Know importance of sustainable development.
- 4) Correlate knowledge of sustainable development with plant sciences

Course Outcomes:

By the end of the course, students should be able to:

- 1) Explain the causes of environmental issues
- 2) Discuss concepts related to environmental laws and ethics.
- 3) Discuss the sustainable development goals.
- 4) Compare and analyze the importance of plant sciences in meeting the sustainable development goals

Module	Title and Contents:	Hrs
Module -1:	Module -1: Environmental issues 1.1 Pollution (Air, Water and Land), 1.2 Fresh-water overuse, 1.3 Natural disasters, 1.4 Fuel and Energy shortage due to overuse, 1.5 Increase in wasteland, 1.6 Biodiversity loss, 1.7 Global warming and climate change (Causes and intensity of the problem), 1.8 Role of Botany in creation of environmental issues	10
Module -2:	Module -2: Environmental laws and ethics 2.1 Environmental Protection Act 2.2 Wildlife Protection Act 2.3 Forest Conservation Act 2.4 Prevention and Control of Pollution Act (Air, water and Land), 2.5 From unsustainable to sustainable development, 2.6 Responsibilities of an environmentally aware citizen	07
Module -3:	Sustainable Development Goals 3.1 Global sustainable goals with emphasis on environment related Sustainable Development goals.	07

Module -4:	Module -4: Role of Plant Sciences in meeting the sustainable development goals. 1. Examples and case studies	06
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Reference Books: -

- 1) Agarwal, K.C. "Environmental Biology", Nidi Pub. Ltd., Bikaner, 2001
- 2) Agarwal, S.K. "Fundamentals of Ecology." (New Delhi: APH Publishing Corporation, 2008
- 3) Brunner, R.C. "Hazardous Waste Incineration". McGraw Hill Inc., 1989
- 4) Odum, E.P., Barrett, G.W. "Fundamentals of Ecology". California: Thomson Brooks/Cole Publishing, 2005
- 5) Sharma, P.D. "Ecology and Environment". Meerut: Rastogi Publications, 2007

Evaluation Pattern:

Total Marks: 50

Internal Continuous Evaluation (20Marks): • CCE-I: Home Assignment: 10 Marks • CCE-II: Short and long answer questions Test/ Seminar/Open Book Test/Quiz/Case study/ Book review/Field work/ Industry visit: 10 Marks • CCE-III: MCQ Test :10 Marks • Note: Internal evaluation (Best of two CCE Marks will be considered)	End Semester Examination (30Marks): • Question-1: Solve the following questions (five questions of 2 marks) 10 M • Question-2: Attempt any two questions (three questions of 10marks) 20 M • Question-3: Attempt any four questions (five questions of 5 marks) 20 M • Note: Conversion of 50 marks of ESE to 30 marks
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Study Tour/ Excursion:

One teacher along with a batch not more than 20 students is taken for excursions to places of study interest, one in each term. If there are female students in a batch of sixteen, one additional lady teacher is permissible for excursion. Each excursion will not be more than 3 days during college working days. T.A. and D.A. for teachers and non-teaching staff participating in the excursions should be paid as per the rules. The tour report duly certified by the concerned teacher and the head of the department should be submitted at the time of practical examination