Detailed Course Scheme

Bachelor of Science (Hons.)

Agriculture

Semester-V

(2023- 27)

DOC202407170011

RNB GLOBAL UNIVERSITY

RNB Global City, Ganganagar Road,
Bikaner, Rajasthan 334601

OVERVIEW

RNB Global University follows Semester System along with Choice Based Credit System as per latest guidelines of University Grants Commission (UGC). Accordingly, each academic year is divided into two semesters, **Odd(July-December) and Even (January-June).**Also, the university follows a system of continuous evaluation along with regular updating in course curricula and teaching pedagogy.

The Curriculum for B. Sc Agriculture program for (July-December) **Odd Semester** 2025 along with examination pattern is as follows:

Course Scheme

Semester –V

S. No.	Course Code	Course Name	L	T	P	Credits
1.	20016800	Principles of Integrated Pest and Disease Management	2	0	0	2
2.	20016900	Principles of Integrated Pest and Disease Management Lab	0	0	2	1
3.	20017000	Manures, Fertilizers and Soil Fertility Management	2	0	0	2
4.	20017100	Manures, Fertilizers and Soil Fertility Management lab	0	0	2	1
5.	20017200	Pests of Crops and Stored Grain and their Management	2	0	0	2
6.	20017300	Pests of Crops and Stored Grain and their Management Lab	0	0	2	1
7.	20017400	Diseases of Field and Horticultural Crops and their Management-I	2	0	0	2
8.	20017500	Diseases of Field and Horticultural Crops and their Management-ILab	0	0	2	1
9.	20017600	Crop Improvement-I*(Kharif Crops)*	1	0	0	1
10.	20017700	Crop Improvement-I Lab *(Kharif Crops)*	0	0	2	1
11.	20018200	Practical Crop Production–I(*Kharif* crops)	0	0	4	2
12.	20018300	Intellectual Property Rights	1	0	0	1
13.	-	Elective–II	2	0	0	2
14.	-	Elective-II Lab	0	0	2	1
15.	20018400	Ability and Skill Enhancement-V	2	0	0	2
16.	20018500	Summer Internship and Report	0	0	8	4
17.	99003300	Workshops & Seminars/ Human Values & Social Service/NCC/NSS	-	-	-	1
	Total		**14**	**0**	**24**	**27**

Elective	Course Code	Course Name
Elective II	20018600	Geoinformatics and Nano-technology and Precision Farming
	20018700	Geoinformatics and Nano-technology and Precision Farming Lab
	20018800	Farming System & Sustainable Agriculture
	20018900	**Weed Management**
	20019000	**Weed Management Lab**
	20019100	Micro propagation Technologies
	20019200	Micro propagation Technologies Lab

EVALUATION SCHEME - THEORY

The evaluation of the theory paper of B.Sc. Agriculture program would be based on Internal and External Assessments. Internal Assessment would consist of 50% of the marks (50 marks) and external assessment (in form of End Term Exam) would consist of remaining 50% marks (50 marks). Detailed scheme of Internal and External Assessments as follows:

Internal Assessment

The distribution of Internal Assessment Marks is as follows:

Type	Details	Marks
Mid Term	One Mid-term Sessional	25
Marks obtained in various Tests, Assignments, Presentations, Quiz, Tutorials, etc.	Average of marks obtained	20
Attendance	75% + : 5 marks	5
TOTAL	**50**	

External Assessment

Type	Marks
Theory	50

EVALUATION SCHEME - PRACTICAL

The evaluation of the practical paper of B.Sc. Agriculture program would be based on Internal and External Assessments. Internal Assessment would consist of 50% of the marks (50 marks) and external assessment (in form of End Term Exam) would consist of remaining 50% marks (50 marks). Detailed scheme of Internal and External Assessment is as follows:

Internal Assessment

Type	Details	Marks
Marks obtained in various manuals, practical file, participation, any model prepared, output of practical	Average of marks obtained	45
Attendance	75%+: 5 marks	5
TOTAL	**50**	

External Assessment

Type	Marks
Practical	50

EVALUATION SCHEME- WORKSHOPS & SEMINARS & NCC/NSS

1. NCC/NSS will be completed from Semester I – Semester IV. It will be evaluated internally by the institute. The credit for this will be given at the end of Semester.

2. The students have to join club/clubs with the active participation in different activities of club. The students would be continuously assessed from Semester-I to Semester-IV and credits and marks would be given after the end of Semester.

1. Vision

Vision of School of Agriculture is to be established as advanced studies and research and skill-based centre for students and scholars.

2. Mission

Mission of School of Agriculture is to cultivate a scholarly mindset and analytical abilities in students, as well as train them in agricultural sphere, to reach the profession's daunting needs by providing dynamic knowledge in the field of agriculture.

3. Program Educational Objectives (PEOs)

After successful completion of the program, the graduates will be

AGPEO 1: Able to apply concepts of basic and applied sciences to Agriculture

AGPEO 2: Able to design and develop interdisciplinary and innovative systems.

AGPEO 3: Able to inculcate effective communication skills, team work, ethics, leadership in preparation for a successful career in agriculture and R&D organizations.

4. Program Outcomes (POs)

Students graduating with the B.Sc. (Hons.) Agriculture degree should be able to:

PO1. Agriculture knowledge: Apply the knowledge of basic and applied sciences to agriculture, agriculture fundamentals and agriculture specialization to the solution of complex agriculture problems. Apply the knowledge of regenerative agriculture with a conservation and rehabilitation approach to food and farming systems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex agriculture problems reaching substantiated conclusions using first principles of basic and applied sciences. Understand rapid appraisal of agricultural innovation systems, a diagnostic tool that can guide the analysis of complex agricultural problems and innovation capacity of the agricultural system towards futuristic agriculture.

PO3. Design/development of solutions: Design solutions for complex agriculture problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, social, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern agriculture and IT tools including prediction and modelling to complex agriculture activities with an understanding of the limitations. Learning use of GIS, IoT, Automation, Intelligent Systems in Farming & Agriculture development & trading.

PO6. The agriculture graduate and society: Apply reasoning informed by the contextual knowledge to assess social, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional agriculture practices. Recognize, analyze, and evaluate the critical human and social factors impacting agriculture. Understand the social dimensions of agriculture and its connections with food and environmental systems.

PO7. Environment and sustainability: Understand the impact of the professional agriculture solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the agriculture practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex agriculture activities with the agriculture community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the agriculture and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. Able to design, launch and run a new business, to create job and not to seek for job. Also capable with an effective mix of knowledge, skills, and personal attitudes to be employed initially and function successfully in the required roles.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

5. Program Specific Outcomes (PSOs)

At the end of the program, the student will be able to:

PSO 1. Clearly understand the concepts and applications in the field of agriculture. Apply the knowledge of crop cultivation, crop improvement, soil and crop management for sustainable organic agricultural production and development.

PSO 2. Associate the learning from the courses related to agriculture to arrive at solutions to real world problems. Analyze and identifying complex agricultural problems and formulating ethical solutions using the principles of agricultural science, and business.

PSO 3. Have the capability to comprehend the technological advancements in the usage of modern design tools to analyze and design subsystems/processes for a variety of applications. Develop innovative processes, products, and technologies to meet the challenges in agriculture and farming practices

PSO 4. Possess the skills to communicate in both oral and written forms, the work already done and the future plans with necessary road maps, demonstrating the practice of professional ethics and the concerns for social and environmental wellbeing.

6. Course outcomes

Course	Course outcomes: - After completion of these courses students should be able to
20016800 - Principles of Integrated Pest and Disease Management	**CO1:** Demonstrate skills about methods of detection and diagnosis of insect pest and diseases and application of different pest and disease control techniques. **CO2:** Identify the understanding about the role of IPM in sustainable agriculture as the future of modern plant protection in pest and disease control strategy. **CO3:** Analyse prevention and control measures during the disease spread, disease cycle and integrated pest managements in cereal, millet, major oil crops and legumes. **CO4:** Evaluate economic injury level and economic threshold level for timely application of control measures for pest management. **CO5:** About development and validation of IPM module.
20016900- Principles of Integrated Pest and Disease Management Lab	**CO1:** How to diagnosis and detection of various insect pests, and plant diseases. **CO2:** Outline the methods of insect pests and plant disease measurement. **CO3:** Identification of biocontrol agents, different predators and natural enemies. **CO4:** Take Part in mass multiplication of Trichoderma, Pseudomonas, Trichogramma, NPV etc. **CO5:** Recommend the best methods of disease and pest management at farmer field level.
20017000 - Manures, Fertilizers and Soil Fertility Management	**CO1:** Recall the manures, its applications, composition and different methods for its preparation. **CO2:** Explain the concept of soil fertility, productivity and how it can be enhanced. **CO3:** Identify the mechanisms of nutrient transport to plants and factors affecting nutrient availability to plants. **CO4:** Analyse critical levels of different nutrients in soil, Classify different forms of nutrients in soil and Take part in plant analysis & rapid plant tissue tests. **CO5:** Recommend the methods of fertilizer application in different conditions for maximum Nutrient Use Efficiency (NUE)
20017100- Manures, Fertilizers and Soil Fertility Management lab	**CO1:** Recall the analytical instruments and their principles, calibration and applications. **CO2:** Explain how colorimetry and flame photometry works. **CO3:** Explain the procedure of determination of N, P, K and S in plants. **CO4:** Demonstrate how to estimate soil organic carbon. **CO5:** Demonstrate how to estimate exchangeable K, Ca, and Mg in soil.

20017200 – Pests of Crops and Stored Grain and their Management	**CO1:** Explain the identification, taxonomy, host range, biology and bionomics, nature of the damage and preventive and curative control measures of crop and stored grain pests. **CO2:** Apply the ecological approach to insect pest management. **CO3:** Explain the technique to operate various pesticide appliances as a knap-sack sprayer, foot sprayer, aerosol, fumigators, etc, for pesticide application. **CO4:** Build crop-wise IPM modules for sustainable agriculture and Storage structure and methods of grain storage to minimize the risk of food security. **CO5:** Importance of Storage structure and methods of grain storage and fundamental principles of grain store management.
20017300- Pests of Crops and Stored Grain and their Management Lab	**CO1:** Name of different insect pests and Mites associated with stored grain **CO2:** Classify various insect pests attacking crops and their produce **CO3:** Identify of different types of damage. **CO4:** Analyse of moisture content of grain. **CO5:** Choose the different Methods of grain sampling under storage condition.
20017400 - Diseases of Field and Horticultural Crops and their Management -I	**CO1:** Find the common pathogens of different diseases in the crops. **CO2:** Explain about etiology and symptoms of these diseases which helps in diagnosis of the diseases of field and horticultural crops **CO3:** Identify the different culture, techniques and biology of pathogens in the laboratory. **CO4:** Apply Eco-friendly and economically suitable management practices. **CO5:** Elaborate of disease cycle and management of major diseases of field and horticulture crops.
20017500- Diseases of Field and Horticultural Crops and their Management -I Lab	**CO1:** How to identification of diseases of field crops. **CO2:** Explain histopathological studies of selected diseases of horticultural crops. **CO3:** Examine histopathological studies of selected diseases of field crops. **CO4:** Develop a herbarium collection and preservation of plant diseased specimens. **CO5:** Identify of selected diseases of horticultural crops.
20017600 – Crop Improvement-I *(Kharif Crops)*	**CO1:** Recall the evolutionary history of important field crops along with their centre of origin, its wild species and wild relatives that can be utilized in crop improvement. **CO2:** Identify Genetic basis and methods of breeding in cross pollinated crops and modes of selection. **CO3:** Build the understanding of germplasm conservation, utilization, and genetics of qualitative and quantitative characters, and their inheritance. **CO4:** Elaborate breeding procedures, methods and breeding objectives in different crop which is important for the development of improved

	varieties. **CO5:** Interpret Gene preservation method for further use to improve kharif crops.
20017700 Crop Improvement-I Lab (Kharif Crops)	**CO1:** Define important agronomic experiments of *Kharif* crops at experimental farms. **CO2:** Explain morphological characteristics of kharif crops. **CO3:** Experiment with study of yield contributing characters of *kharif* season crops, **CO4:** Analyse sowing methods kharif crops, identifications of weed in kharif season. **CO5:** Recommend visit to research stations of related crops.
20018200 – Practical Crop Production – I (Kharif Crops)	**CO1:** Summarize how to prepare field, seed treatment, nursery raising, sowing, nutrient management, water management and weed management. **CO2:** Plan the management of insect pests and diseases of crops also describe about harvesting, threshing, drying, winnowing, storage and marketing of produce from kharif crops. **CO3:** Categorize and Develop knowledge about preparation of balance sheet including cost of cultivation, net returns per student as well as per team of a group of students. **CO4:** Explain production techniques of major Kharif season crops according to resources available in the field. **CO5:** Determination of fertilizer requirement
20018300 - Intellectual Property Rights	**CO1:** Memorize the history of IPR development with various treaties and conventions, laws of IPR, various forms of IPR property and their importance in research. **CO2:** Explain about traditional knowledge-meaning and rights of TK holders. **CO3:** Apply the principles of intellectual property law (including copyright, patents, designs, and trademarks) to solve real problems and analyse the social impact of intellectual property law and policy. **CO4:** Impart UPOV for protection of plant varieties, Protection of plant varieties under UPOV and PPV&FR Act of India. **CO5:** Explain the various rules and regulations regarding Patent and copyright.
20018400 – Ability and Skill Enhancement -V	**CO1:** Express and build leadership quality **CO2:** Recall the traits of Successful Entrepreneurs, and Entrepreneurial qualities **CO3:** Classify the differences between organizational decision making process, entrepreneurial decision making process **CO4:** Create work related skills and prepare effective interview questions to conduct effective interviews. **CO5:** Enhance employability skills

20018500 - Summer Internship and Report	**CO1:** Understand the real-time working of organizations. **CO2:** Demonstrate professional knowledge, skills and attitude along with the experience needed to constitute a successful career. **CO3:** Analyse career opportunities in their areas of interest. **CO4:** Build aptitude for gaining supervised professional experiences. **CO5:** Create a clear understanding of industry trends and advancements
20018600 - Geoinformatics and Nano-technology and Precision Farming	**CO1:** Define precision agriculture: concepts and techniques; their issues and concerns for Indian agriculture. **CO2:** Explain Geo-informatics- definition, concepts, tool and techniques; their use in Precision Agriculture. **CO3:** Develop remote sensing concepts and application in agriculture. **CO4:** Analyse crop Simulation Models and their uses for optimization of Agricultural Inputs. **CO5:** Importance of nano-particles, nano-pesticides, nano-fertilizers, nano-sensors
20018700 - Geoinformatics and Nano-technology and Precision Farming Lab	**CO1:** Define GIS software, spatial data creation and editing. **CO2:** Explain Introduction to image processing software. **CO3:** Develop Visual and digital interpretation of remote sensing images. **CO4:** Analyse Generation of spectral profiles of different objects. **CO5:** Importance of Multispectral remote sensing for soil mapping.
20018900 - Weed Management	**CO1:** Introduction to weeds and their classification. **CO2:** Acquaintance with herbicide classification and formulation, mode of action of herbicide **CO3:** Understand herbicide selectivity, allelopathy and its application in weed management. **CO4:** Discuss about bio-herbicide, herbicide mixture and utility in agriculture. **CO5:** Information about herbicide resistance and management.
20019000 - Weed Management Lab	**CO1:** Identification of common weeds. **CO2:** Introduction to weed preservation techniques. **CO3:** Study about biology of weeds, weed flora in long term experiments. **CO4:** Analyze herbicide formulation, mixture of herbicide, weed control efficiency. **CO5:** Study about herbicide application methods, spraying equipments.
20019100 - Micro propagation Technologies	**CO1:** Define and explain the concept of micro propagation and its importance in agriculture. **CO2:** Explain the importance of growing media use in tissue culture. **CO3:** Make use roles of the major and minor nutrients in tissue culture. **CO4:** Examine demonstrate basic micro propagation and nursery techniques **CO5:** Explain stages of plant growth during micro propagation of a selected

	plant
20019200 - Micro propagation Technologies Lab	**CO1:** Define learning important milestones in the plant tissue culture. **CO2:** Explain techniques of sterilization and monitoring method of sterilization. **CO3:** Understanding the concepts and principles of Plant tissue culture. **CO4:** Experiment with performing procedures for micropropagation techniques in different crops. **CO5:** Determine learning methods to conserve germplasm under In vitro.
20018000 – Bio pesticides & Bio fertilizers	**CO1:** Tell about the bio pesticides: importance, scope and potential of bio pesticides. **CO2:** Demonstrate bio fertilizers its status and scope and characteristic features of various bacterial bio fertilizers. **CO3:** Experiment with the storage, shelf life, quality control, marketing and factors influencing the efficacy of Bio-pesticides & Bio-fertilizers. **CO4:** Analyse mechanism of Production technology of Bio-pesticides & Bio-fertilizers. **CO5:** Determine mechanism of Production technology of Bio-pesticides & Bio-fertilizers.
20018100 - Bio pesticides & Bio fertilizers	**CO1:** Describe about bio pesticides: importance, scope and potential of bio pesticides. **CO2:** Describe about bio fertilizers its status and scope and characteristic features of various bacterial bio fertilizers. **CO3:** Interpret storage, shelf life, quality control, marketing and factors influencing the efficacy of Bio-pesticides & Bio-fertilizers. **CO4:** Describe mechanism of Production technology of Bio-pesticides & Bio-fertilizers. **CO5:** Choose the best fertilizers and bio-pesticide for maximize the crop production.

7. CO PO Mapping

20016800	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		2	3	3	2		2	2		3	2
CO2	3			2		3	2	2				
CO3	3	2	2		3	3	2		2	3	3	3
CO4	2	3	3	3	3		3	3		3	3	3
CO5	2	3	3		2		2	2	3			2

20016900	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	2	2	1		2			2
CO2	2	3	3	2	3	1	2	1		1		1
CO3	3	3	2	2	2	1	2					
CO4	3	2	3	3	3	1						
CO5	3	3	2	2	2							

20017000	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	2	2	2	3	2	2	3
CO2	3	3	2	3	2	2	3	1	3	2	2	3
CO3	3	3	2	3	2	2		2	3	2	2	3
CO4	3	3	1	3	3	1	2	2	3	2	3	3
CO5	3	2	3	2	1	3	3	3	2	2	2	3

20017100	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	3	3	3	3	3	3	2	3
CO2	3	3	3	3	3	3	3	3	3	3	2	2
CO3	3	2	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	2	2	2
CO5	2	2	3	3	3	3	3	2	2	3	3	3

20017200	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2		2		2		2	2		3
CO2	3	3		2		2		2	2		2	
CO3	2		3		2	2		2		2	2	2
CO4	3	3	2	2	3		2		2			2
CO5	3	2	3	3	2		3	3	3	3		3

20017300	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2		2		2		2	2		3
CO2				2			1	2	2		2	
CO3	1		1			2				2	1	2
CO4		3	2	2	1		2		2			1
CO5	3	2	3	1	2	1		3	3	3		

20017400	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3		3		2	2				2	3
CO2	3	3	3	3	2		2	3	3	3		
CO3	3	3	3	2	2	2		2	2			
CO4	3		2		3				3	3	2	3
CO5	3	2	3	3	2		3	2	3	2	3	3

20017500	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3		2	2	2		3	2		2	3
CO2	3	2	3	2	2	3	2	3		3		3
CO3	3			3	3	2	2	3	3	3	3	2
CO4	2	2	2		2	3	2			3	2	3
CO5	3	3		3		2	3		3		3	3

20017600	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	3	3	3		2	3	2	2
CO2	2	3			3	3	2	2	3	3	2	2
CO3	2	3	2	3	3			2	2		2	3
CO4	3	3	2			3	2	3	3	2	3	2
CO5	2	2	3	3		2	3		2			

20017700	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	3	3	2	3	3	2	2	3
CO2	3	3	3	3	2	2	3	3	2	3	2	2
CO3	2	3	3	2	3	3	3	2	3	2	3	2
CO4	3	2	2	3	2	2	2	3	3	3	2	2
CO5	2	2	3	3	3	3	3	2	3	2	2	2

20018200	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2		3	3		2	2	2	3	3	3
CO2	3	2	3	3	3	2	3			2	3	3
CO3	3			2	2				3	2	3	2
CO4	3	3	2	3	3	3	2	2	2		2	3
CO5	2	3		3	3		3	3	3		3	2

20018300	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3		2	2	2	2	3		3	3	2
CO2	2	3	3	2		2	2		3	3	2	3
CO3	3	2			2			2	2	2		3
CO4	3	2	2				2	2	3		3	2
CO5	3		3		3	3		3		3	3	3

20018400	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	2	2					3	2	2
CO2	2			3	2	2		2		3		2
CO3	3	3				2		3	2	3	3	2
CO4		2	3	3	2	3		3	2	3		2
CO5	3	3	2	2	3	2	3	2	3	2	3	2

20018500	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3		2	3			2		3	3	3
CO2	3	3	2	2	3					3	3	3
CO3	3	3	3	3	3	2		2	2	3	3	3
CO4	3	3	3	3	3	2		2	2	3	3	3
CO5	3	3	3	3	3	3		3	3	3	3	3

20018600	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	2	2	2	2	3	2	2	3
CO2	2	1	3	3	2	2	3	2	3	3	2	3
CO3	3	3	2	3	2	2	2	1	3	2	2	3
CO4	3	3	2	3	3	2	2	3	3	2	2	2
CO5	2	2	3	1	2	3	3	3	2	3	3	2

20018700	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	2	2	2	2	2	3	2	2	3
CO2	2	1	3	2	2	3	3	3	2	3	3	2
CO3	3	3	2	3	2	2	2	1	3	2	2	3
CO4	3	3	2	3	3	2	2	3	3	2	2	2
CO5	3	2	3	2	2	3	3	2	2	2	2	3

20018900	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	3	2	2	3	3	3	3	2	3
CO2	3	3	3	3	3	3	3	2	2	3	3	3
CO3	3	3	3	2	2	2	2	2	3	2	2	2
CO4	2	2	2	2	3	3	3	3	2	2	3	2
CO5	3	2	2	3	2	3	2	3	2	3	2	3

20019000	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	3	2	3	2	2	3	2	3
CO2	2	3	3	3	3	2	2	3	3	3	3	2
CO3	2	2	3	2	2	3	3	3	3	2	2	2
CO4	3	2	3	3	2	3	2	2	3	3	3	3
CO5	3	3	3	2	3	2	2	3	2	2	2	3

20019100	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	3	3	3	2	2	3
CO2	3	3	3	2	2	3	3	3	3	3	3	2
CO3	3	3	2	3	3	2	2	2	3	2	2	2
CO4	3	3	3	3	3	3	3	2	2	3	2	2
CO5	3	2	3	2	3	2	2	3	2	2	2	2

20019200	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	2	2	3	2	3	2	2
CO2	3	3	2	3	2	3	3	2	3	2	3	2
CO3	3	3	3	3	3	2	3	3	2	3	2	3
CO4	2	2	3	3	3	3	2	2	3	2	3	2
CO5	3	3	3	2	3	2	2	3	2	3	2	2

20018000	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2		2	2	3	2	2	3	3	3
CO2	3	3	3	2	3	3	3	2	3	3	3	3
CO3	3	3	3	2	3	3	3	2	3	2	2	3
CO4	3	2	2	3	3	3	2	3	3	2	3	3
CO5	3	3		2	3	2	3	3	2	3	3	3

20018100	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2			2	2	3	2	2	3	3	
CO2			3	2				1				1
CO3	2	3	1	1	2				3	2		
CO4							2				3	2
CO5	3	3				2			2	3	3	

8. CURRICULUM

Course Name: Principles of Integrated Pest and Disease Management

Course Code: 20016800

Course Outline

Unit I

Categories of insect pests and diseases, IPM: Introduction, history, importance, concepts, principles and tools of IPM. Economic importance of insect pests, diseases and pest risk analysis. Methods of detection and diagnosis of insect pest and diseases. Calculation and dynamics of economic injury level and importance of Economic threshold level. Methods of control: Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control.

Unit II

Ecological management of crop environment. Introduction to conventional pesticides for the insect pests and disease management. Survey surveillance and forecasting of Insect pest and diseases. Development and validation of IPM module. Implementation and impact of IPM (IPM module) for Insect pest and disease. Safety issues in pesticide uses. Political, social and legal implication of IP.

Course Name: Principles of Integrated Pest and Disease Management Lab

Course Code: 20016900

Course Outline

1. Methods of diagnosis and detection of various insect pests, and plant diseases
2. Methods of insect pests and plant disease measurement
3. Assessment of crop yield losses, calculations based on economics of IPM
4. Identification of bio-control agents, different predators and natural enemies
5. Mass multiplication of *Trichoderma, Pseudomona*s, *Trichogramma*, NPV etc.
6. Identification and nature of damage of important insect pests and diseases and their management.
7. Crop (agro-ecosystem) dynamics of a selected insect pest and diseases.
8. Plan & assess preventive strategies (IPM module) and decision making.
9. Crop monitoring attacked by insect, pest and diseases .
10. Awareness campaign at farmers' fields.

Course Name: Manures, Fertilizers and Soil Fertility Management

Course Code: 20017000

Course Outline

Unit I

Introduction and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green/leaf manuring. Fertilizer recommendation approaches. Integrated nutrient management. Chemical fertilizers: classification, composition and properties of major nitrogenous, phosphate, potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, nano-fertilizers.

Unit II

Soil amendments, Fertilizer Storage, Fertilizer Control Order. History of soil fertility and plant nutrition. criteria of essentiality. role, deficiency and toxicity, symptoms of essential plant nutrients, Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. Chemistry of soil nitrogen, phosphorus, potassium,calcium, magnesium, sulphur and micronutrients. Soil fertility evaluation.

Unit III

Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants. Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under Rainfed and irrigated conditions

Course Name: Manures, Fertilizers and Soil Fertility Management Lab

Course Code: 20017100

Course Outline

1. Introduction of analytical instruments and their principles, calibration and applications.
2. Colorimetric and flame photometry.
3. Estimation of soil organic carbon.
4. Estimation of alkaline hydrolysable N in soils.
5. Estimation of soil extractable P in soils.
6. Estimation of exchangeable K; Ca and Mg in soils.
7. Estimation of soil extractable S in soils.
8. Estimation of DTPA extractable Zn in soils.
9. Estimation of N in plants.
10. Estimation of P in plants.
11. Estimation of K in plants.
12. Estimation of S in plants.

Course Name: Pests of Crops and Stored Grain and their Management

Course Code: 20017200

Course Outline

Unit I

General account on nature and type of damage by different arthropods pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of various field crop, vegetable crop, fruit crop, plantation crops, ornamental crops, spices and condiments.

Unit II

Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain. Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management. Storage structure and methods of grain storage and fundamental principles ofgrain store management.

Course Name: Pests of Crops and Stored Grain and their Management Lab

Course Code: 20017300

Course Outline

1. Identification of different types of damage.
2. Identification and study of life cycle and seasonal history of various insect pests attacking crops and their produce: (a) Field Crops; (b) Vegetable Crops; (c) Fruit Crops; (d) Plantation, gardens, Narcotics, spices & condiments.
3. Identification of insect pests and Mites associated with stored grain.
4. Determination of insect infestation by different methods.
5. Assessment of losses due to insects.
6. Calculations on the doses of insecticides application technique.
7. Fumigation of grain store / godown.
8. Identification of rodents and rodent control operations in god owns.
9. Identification of birds and bird control operations in god owns.
10. Determination of moisture content of grain.
11. Methods of grain sampling under storage condition.
12. Visit to Indian Storage Management and Research Institute, Hapur and Quality Laboratory, Department of Food., Delhi.
13. Visit to nearest FCI god owns.

Course Name: Diseases of Field and Horticultural Crops and their Management -I

Course Code: 20017400

Course Outline

Unit I

Symptoms, etiology, disease cycle and management of major diseases of following crops:
Field Crops: Rice: blast, brown spot, bacterial blight, sheath blight, false smut, khaira and tango; Maize: stalk rots, downy mildew, leaf spots; Sorghum: smuts, grain mold and anthracnose, Bajra :downy mildew and ergot; Groundnut: early and late leaf spots, wilt
Soybean: Rhizoctonia blight, bacterial spot, seed and seedling rot and mosaic; Pigeon pea:
Phytophthora blight, wilt and sterility mosaic; Finger millet: Blast and leaf spot; black & green gram: Cercospora leaf spot and anthracnose, web blight and yellow mosaic; Castor: Phytophthora blight; Tobacco: black shank, black root rot and mosaic.

Unit II
Horticultural Crops: Guava: wilt and anthracnose; Banana: Panama wilt, bacterial wilt, Sigatoka and bunchy top; Papaya: foot rot, leafcurl and mosaic, Pomegranate: bacterial blight; Cruciferous vegetables: Alternaria leaf spot and black rot; Brinjal: Phomopsis blight and fruit rot and Sclerotinia blight; Tomato: damping off, wilt, early and late blight, buck eye rot and leaf curl and mosaic; Okra: Yellow Vein Mosaic; Beans: anthracnose and bacterial blight; Ginger: soft rot; Colocasia: Phytophthora blight; Coconut: wilt and bud rot; Tea: blister blight; Coffee: rust.

Course Name: Diseases of Field and Horticultural Crops and their Management -I Lab

Course Code: 20017500

Course Outline

1. Identification and histo-pathological studies of selected diseases of field crops covered in theory.
2. Identification and histo-pathological studies of selected diseases of horticultural crops covered in theory.
3. Field visit for the diagnosis of field problems.
4. Collection of plant diseased specimens for herbarium.
5. Preservation of plant diseased specimens for herbarium.

Course Name: Crop Improvement-I *(Kharif Crops)*

Course Code: 20017600

Course Outline

Unit I

Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fibres; fodders and cash crops; vegetable and horticultural crops; Plant genetic resources, its utilization and conservation, study of genetics of qualitative and quantitative characters; Important concepts of breeding self-pollinated, cross pollinated and vegetative propagated crops;

Unit II

Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional); Hybrid seed production technology in Maize, Rice, Sorghum, Pearl millet and Pigeon pea, etc. Ideotype concept and climate resilient crop varieties for future.

Course Name: Crop Improvement-I Lab *(Kharif Crops)*

Course Code: 20017700

Course Outline

1. Floral biology, emasculation and hybridization techniques in different crop species; viz., Rice, Jute, Maize, Sorghum, Pearl millet, Ragi, Pigeon pea, Urdbean, Mungbean, Soybean, Groundnut, Seasame, Caster, Cotton, Cowpea, Tobacco, Brinjal, Okra and Cucurbitaceous crops.
2. Maintenance breeding of different *kharif* crops.
3. Handling of Germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods
4. Study of field techniques for seed production and hybrid seeds production in *Kharif* crops;
5. Estimation of heterosis, inbreeding depression and heritability
6. Layout of field experiments
7. Study of quality characters, donor parents for different characters
8. Visit to seed production plots
9. Visit to AICRP plots of different field crops

Course Name: Practical Crop Production – I (*Kharif* crops)

Course Code: 20018200

Course Outline

1. Crop planning
2. Raising field crops in multiple cropping systems
3. Field preparation, seed, treatment, nursery raising, sowing, nutrient and water
4. Weed management and
5. Management of insect-pests, diseases of crops
6. Harvesting, threshing, drying winnowing
7. Storage and marketing of produce
8. The emphasis will be given to seed production, mechanization, resource conservation and integrated nutrient, insect-pest and disease management technologies.
9. Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of 8-10 students

Course Name: Intellectual Property Rights

Course Code: 20018300

Course Outline

Unit I

Introduction and meaning of intellectual property, brief introduction to GATT, WTO, TRIPs and WIPO, Treaties for IPR protection: Madrid protocol, Berne Convention, Budapest treaty, etc. Types of Intellectual Property and legislations covering IPR in India:-Patents, Copyrights Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets. Patents Act 1970 and Patent system in India, patentability, process and product patent, filingof patent, patent specification, patent claims, Patent opposition and revocation, infringement, Compulsory licensing, Patent Cooperation Treaty, Patent search and patent database.

Unit II

Origin and history including a brief introduction to UPOV for protection of plant varieties,

Protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeders rights,

Registration of plant varieties under PPV&FR Act 2001, breeders, researcher and farmers rights. Traditional knowledge-meaning and rights of TK holders., Convention

on Biological Diversity, International treaty on plant genetic resources for food and agriculture (ITPGRFA). Indian Biological Diversity Act, 2002 and its salient features, access and benefit sharing.

Course Name: Ability and Skill Enhancement V

Course Code: 20018400

Course Outline – Final Assessment - Interview with an Entrepreneur /Leader

Unit I: Leadership
What is leadership? Traits of Leadership, Identifying leaders and traits of Leadership, Movie/ Story/ Interviews of leaders: Identify leadership qualities, Debate/ Discussion/ Presentations on leaders.

Unit II: Entrepreneurship
What is Entrepreneurship, Traits of Successful Entrepreneurs, Movie/ Story/Interviews of Entrepreneurs: Identify Entrepreneurial qualities, Debate/ Discussion/Presentation on Entrepreneurs.

Unit III: Organizational Skills & Employability Skills
What are organizational skills, how to develop them, the skills needed to become a successful entrepreneur/administrator, good communication, ambition, courage, hard work, planning, accountability. Organizational skills can be developed by discipline making a system, rules, delegation of power at workplace, etc.
How to enhance employability; skills, why do we need them, different workplaces, having different needs, different skills, how to recognize different work skills.

Unit IV: Decision making
The process of decision making, its steps, what are its basics, what are the basics of organizational decision making process, entrepreneurial decision making, how to make a right decision at right time, dilemma.

Unit V: Interview Skills
Conducting Interviews with Leaders/ Entrepreneurs, Preparing Questions, Interviewing the fellow person, do's & don'ts while taking interview.

Note: The review of Syllabus happens on periodic basis for the benefit of the students. In case there are changes in curriculum due to review, students would be intimated in writing.

Course Name: Weed Management

Course Code: 20018900

Course Outline

Unit I

Introduction to weeds, characteristics of weeds their harmful and beneficial effects on ecosystem. Classification, reproduction and dissemination of weeds. Herbicide classification, concept of adjuvant, surfactant, herbicide formulation and their use. Introduction to mode of action of herbicides and selectivity. Allelopathy and its application for weed management.

Unit II

Bio-herbicides and their application in agriculture. Concept of herbicide mixture and utility in agriculture. Herbicide compatibility with agro-chemicals and their application. Integration of herbicides with non chemical methods of weed management. Herbicide Resistance and its management.

Course Name: Weed Management Lab

Course Code: 20019000

Course Outline

1. Techniques of weed preservation.
2. Weed identification and their losses study.
3. Biology of important weeds.
4. Study of herbicide formulations and mixture of herbicide.
5. Herbicide and agro-chemicals study.
6. Shift of weed flora study in long term experiments.
7. Study of methods of herbicide application, spraying equipments.
8. Calculations of herbicide doses and weed control efficiency and weed index.

Suggested Readings

1. Saraswat, V.N., Bhan, V.M. and Yaduraju, N.T. 2003. Weed Management , ICAR, NewDelhi.
2. Gupta, O.P. 2015. Weed Management: Principles and Practices (2nd Ed.), Agribios (India), Jodhpur.
3. Gupta, O.P. 2016. Modern Weed Management , Agribios (India), Jodhpur
4. Das, T.K. 2008. Weed Science : Basics and Applications , Jain Brothers, New-Delhi.
5. Rao, V.S. 2000. Principals of Weed Science (2nd edition), Oxford and IBH Publishing Co., New Delhi.

Course Name: Micro propagation Technologies

Course Code: 20019100

Course Outline

Unit I

Introduction, History, Advantages and limitations; Types of cultures (seed, embryo, organ, callus, cell), Stages of micro propagation, Axillaries bud proliferation (Shoot tip and meristem culture, bud culture).

Unit II

Organogenesis (callus and direct organ formation), Somatic embryogenesis, cell suspension cultures, Production of secondary metabolites, Somaclonal variation, Cryopreservation.

Course Name: Micro propagation Technologies Lab

Course Code: 20019200

Course Outline

1. Identification and use of equipments in tissue culture laboratory.
2. Nutrition media composition.
3. Sterilization techniques for media, containers and small instruments.
4. Sterilization techniques for explants.
5. Preparation of stocks and working solution, Preparation of working medium.
6. Culturing of explants :Seeds, shoot tip and single node.
7. Callus induction.
8. Induction of somatic embryos regeneration of whole plants from different explants.
9. Hardening procedures.

Suggested Readings

1. Chawala H S (2000). Introduction to Plant Biotechnology. Oxford & IBH, New Delhi
2. Gupta, P. K. (2008). Elements of Biotechnology. Rastogi Publications, Meerut
3. Ray V. Herren (2005). Introduction to Biotechnology (An Agricultural revolution)
4. Shekhawat, M. S. (2011) Plant Biotechnology, In vitro Principles, Techniques and Applications. MJP Publishers, Chennai
5. Mascarenhas, A. F. (2008). Hand Book of Plant Tissue Culture. ICAR,New Delhi
6. Singh BD. 2005. Biotechnology, Expanding Horizons. Kalyani Publishers, New Delhi.
7.

9. Lesson Plans

20016800 – Principles of Integrated Pest and Disease Management

Unit	Particulars	Class No.	Pedagogy of Class
Unit- I	Categories of insect pests	C-1	Lecture
Unit -I	Categories of insect pests and diseases	C-2	Lecture
Unit- I	IPM: Introduction, history, importance	C-3	Lecture
Unit -I	Principles and tools of IPM	C-4	Lecture
Unit -I	Economic importance of insect pests	C-5	Lecture
Unit -I	History of IPM	C-6	Lecture
Unit- I	Clarification Class-1	C-7	Clarification Class
Unit- I	Methods of detection and diagnosis of insect pest and diseases	C-8	Lecture
Unit- I	Dynamics of economic injury level	C-9	Lecture
Unit- I	Importance of Economic threshold level	C-10	Lecture
Unit -I	Biological and chemical methods of pest control	C-11	Lecture
Unit -I	Clarification Class	C-12	Clarification Class
	Guest Lecture	C-13	Guest lecture
	Quiz-1	C-14	Quiz
Unit- I	Cultural and mechanical methods of pest control	C-15	Lecture
Unit- I	Physical methods of pest control	C-16	Lecture
Unit -I	Survey surveillance of insect pest	C-17	Lecture
Unit- I	Forecasting of Insect pest and diseases	C-18	Lecture
	Clarification Class-3	C-19	Clarification Class
	Webinar-1	C-20	Webinar
	Home Assignment-1		Home Assignments
	Class Room Assignment 1	C-21	Class Assignment

	Presentation	C-22, 23	Presentation
	Quiz-2	C-24	Quiz
Unit-I	Development and validation of IPM module	C-25	Lecture
Unit-I	Safety issues in pesticides uses	C-26	Lecture
Unit-I	Political, social and legal implication of IP	C-27	Lecture
Unit-I	Diseases and pest risk analysis	C-28	Lecture
Unit-I	conventional pesticides for the insect pests and disease management	C-29	Lecture
Unit-I	Clarification Class	C-30	Clarification Class

20016900 –Principles of Integrated Pest and Disease Management Lab

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Methods of diagnosis and detection of various insect pests	P-1	Practical
Unit-I	Methods of diagnosis and detection of various plant diseases	P-2	Practical
Unit-I	Methods of insect pests measurement, assessment of crop yield	P-3	Practical
Unit-I	Methods of plant disease measurement, assessment of crop yield	P-4, 5	Practical
Unit-I	Losses, calculations based on economics of IPM,	P-6, 7	Practical
Unit-I	Identification of bio-control agents, different predators and natural enemies.	P-8, 9	Practical
Unit-I	Multiplication of *Trichoderma, Pseudomonas* etc.	P-10, 11	Practical
Unit-I	Multiplication of *Trichogramma*, NPVetc.	P-12-13	Practical
Unit-I	Plan & assess preventive strategies (IPM module) and decision making	P-14, 15	Practical

20017000 –Manures, Fertilizers and Soil Fertility Management

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Introduction to Organic Manures	C-1	Lecture
Unit-I	Green/Leaf Manuring	C-2	Lecture
Unit-I	Fertilizer Recommendation Approaches	C-3	Lecture
Unit-I	Integrated Nutrient Management	C-4	Lecture
Unit-I	Chemical Fertilizers: Classification	C-5	Lecture
Unit-I	Nitrogenous Fertilizers	C-6	Lecture
Unit-I	Phosphatic Fertilizers	C-7	Lecture
Unit-I	Potassic Fertilizers	C-8	Lecture
Unit-I	Secondary & Micronutrient Fertilizers	C-9	Lecture
Unit-I	Complex and Nano Fertilizers	C-10	Lecture
Unit-I	Presentation	C-11	Presentation
Unit-I	Clarification Class	C-12	Clarification Class
	Home Assignment		Home Assignment
Unit-II	Soil Amendments	C-13	Lecture
Unit-II	Fertilizer Storage and Control Order	C-14	Lecture
	Class Assignment	C-15	Class Assignment
Unit-II	History of Soil Fertility and Plant Nutrition	C-16	Lecture
Unit-II	Criteria of Essentiality in Plant Nutrition, Nutrient Deficiency and Toxicity,	C-17	Lecture
Unit-II	Mechanisms of Nutrient Transport in Plants, Chemistry of Soil Nutrients	C-18	Lecture
Unit-II	Chemistry of Micronutrients	C-19	Lecture
Unit-II	Soil Fertility Evaluation, Soil Testing Methods	C-20	Lecture
	Clarification Class	C-21	Clarification Class
Unit-III	Forms of Nutrients in Soil	C-22	Lecture
Unit-III	Plant Analysis and Rapid Tissue Tests	C-23	Lecture

	Class Assignment	C-24	Class Assignment
Unit-III	Methods of Fertilizer Recommendations	C-25, 26	Lecture
Unit-III	Factors Influencing Nutrient Use Efficiency (NUE)	C-27, 28	Lecture
	Presentation	C-29	Presentation
	Clarification Class	C-30	Clarification Class

20017100 –Manures, Fertilizers and Soil Fertility Management Lab

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Introduction of analytical instruments and their principles, calibration and applications.	P-1, 2	Practical
Unit-I	Colorimetry and flame photometry.	P-3, 4	Practical
Unit-I	Estimation of soil organic carbon.	P-5	Practical
Unit-I	Estimation of alkaline hydrolysable N in soils.	P-6	Practical
Unit-I	Estimation of soil extractable P in soils.	P-7	Practical
Unit-I	Estimation of exchangeable K; Ca and Mg in soils.	P-8, 9	Practical
Unit-I	Estimation of soil extractable S in soils.	P-10	Practical
Unit-I	Estimation of DTPA extractable Zn in soils.	P-11	Practical
Unit-I	Estimation of N in plants.	P-12	Practical
Unit-I	Estimation of P in plants.	P-13	Practical
Unit-I	Estimation of K in plants.	P-14	Practical
Unit-I	Estimation of S in plants.	P-15	Practical

20017200 –Pests of Crops and Stored Grain and their Management

Unit	Particulars	Class No.	Pedagogy of Class
Unit -I	General account on nature and type of damage by different arthropods pests	C-1	Lecture
Unit -I	Nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of various field crops	C-2, 3, 4, 5	Lecture
Unit -I	Nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of various vegetable crop	C-6, 7, 8, 9	Lecture
	Class Assignment	C-10	Class Assignment
Unit- I	Scientific name, order, family, host range, distribution, biology and bionomics, fruit crops	C-11	Lecture
	Clarification Class I	C-12	Clarification Class
Unit- I	Scientific name, order, family, host range, distribution, biology and bionomics plantation crops	C-13	Lecture
Unit -I	Scientific name, order, family, host range, distribution, biology and bionomics pulse crops	C-14	Lecture
	Class Assignment	C-15	Class Assignment
Unit- I	Scientific name, order, family, host range, distribution, biology and bionomics spices of oilseed crops	C-16	Lecture
	Home Assignment		Home assignment
Unit -I	Scientific name, order, family, host range, distribution, biology and bionomics fiber crops	C-17	Lecture
	Clarification class	C-18	Clarification Class
Unit -I	Scientific name, order, family, host range, distribution, biology and bionomics condiments	C-19	Lecture

	Clarification class	C-20	Clarification Class
Unit- II	Factors affecting losses of stored grain	C-21	Lecture
	Presentation	C-22	Presentation
Unit -II	Role of physical, biological, mechanical and chemical factors in deterioration of grain.	C-23	Lecture
	Quiz	C-24	Quiz I
Unit- II	Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management	C-25, 26	Lecture
Unit- II	Storage structure and methods of grain storage	C-27	Lecture
	Presentation	C-28	Presentation
Unit -II	Fundamental principles of grain store management	C-29	Lecture
Unit -II	Field visit	C-30	Field visit

20017300 –Pests of Crops and Stored Grain and their Management Lab

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Identification of different types of damage.	P-1	Practical
Unit-I	Identification and study of life cycle and seasonal history of various insect pests attacking Field crops and their produce.	P-2	Practical
Unit-I	Identification and study of life cycle and seasonal history of insect pests attacking on Vegetable crops and their produce.	P-3	Practical
Unit-I	Identification and study of life cycle and seasonal history of insect pests attacking on Fruit crops and their produce.	P-4	Practical
Unit-I	Identification and study of life cycle and seasonal history of insect pests attacking on Plantation crops & gardens and their produce.	P-5	Practical
Unit-I	Identification and study of life cycle and seasonal history of insect pests attacking on Narcotics, spices & condiments and their produce.	P-6	Practical
Unit-I	Identification of insect pests and Mites associated with stored grain.	P-7	Practical
Unit-I	Determination of insect infestation by different methods.	P-8	Practical
Unit-I	Assessment of losses due to insects. Calculations on the doses of insecticides application technique.	P-9	Practical
Unit-I	Fumigation of grain store / go-down.	P-10	Practical
Unit-I	Determination of moisture content of grain. Methods of grain sampling under storage condition.	P-11	Practical
Unit-I	Identification of rodents and rodent control operations in go-downs.	P-12	Practical
Unit-I	Identification of birds and bird control operations in godowns.	P-13	Practical
Unit-I	Visit to Indian Storage Management and Research Institute, Hapur and Quality Laboratory,	P-14	Practical
Unit-I	Department of Food, Delhi Visit to nearest FCI godowns.	P-15	Practical

20017400 –Diseases of Field and Horticultural Crops and their Management -I

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Introduction to Plant Pathology: Symptoms and Etiology	C-1	Lecture
Unit-I	Disease Cycle: General Overview	C-2	Lecture
Unit-I	Rice Diseases: Blast, Brown Spot, Bacterial Blight	C-3	Lecture
Unit-I	Rice Diseases: Sheath Blight, False Smut, Khaira, Tungro	C-4	Lecture
	Clarification Class	C-5	Clarification Class
Unit-I	Maize Diseases: Stalk Rots, Downy Mildew, Leaf Spots	C-6	Lecture
	Class Assignment	C-7	Quiz
Unit-I	Sorghum Diseases: Smuts, Grain Mold, Anthracnose	C-8	Lecture
Unit-I	Bajra and Groundnut Diseases: Downy Mildew, Ergot, Early and Late Leaf Spots, Wilt	C-9	Lecture
	Class Assignment	C-10	Class Assignment
Unit-I	Soybean Diseases: Rhizoctonia Blight, Bacterial Spot, Seed and Seedling Rot, Mosaic	C-11	Lecture
	Quiz	C-12	Quiz
Unit-I	Pigeonpea Diseases: Phytophthora Blight, Wilt, Sterility Mosaic	C-13	Lecture
	Home Assignments		Home Assignments
Unit-I	Finger Millet, Black & Green Gram Diseases: Blast, Leaf Spot, Cercospora Leaf Spot, Anthracnose, Web Blight, Yellow Mosaic	C-14	Lecture
Unit-I	Castor and Tobacco Diseases: Phytophthora Blight, Black Shank, Black Root Rot, Mosaic	C-15	Lecture
Unit-II	Guava and Banana Diseases: Wilt, Anthracnose, Panama Wilt, Bacterial Wilt, Sigatoka, Bunchy Top	C-16,17, 18	Lecture
	Presentation	C-19	Presentation

Unit-II	Papaya and Pomegranate Diseases: Foot Rot, Leaf Curl, Mosaic, Bacterial Blight	C-20, 21, 22	Lecture
Unit-II	Cruciferous Vegetables and Brinjal Diseases: Alternaria Leaf Spot, Black Rot, Phomopsis Blight, Fruit Rot, Sclerotinia Blight	C-23, 24, 25	Lecture
	Quiz	C-26	Quiz
Unit-II	Tomato and Okra Diseases: Damping Off, Wilt, Early and Late Blight, Buckeye Rot, Yellow Vein Mosaic	C27, 28, 29	Lecture
	Clarification Class-II	C-30	Lecture

20017500 –Diseases of Field and Horticultural Crops and their Management -I Lab

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Identification of Selected Diseases and Histopathological Studies of Rice Crop Diseases	P-1	Practical
Unit-I	Identification of Selected Diseases and Histopathological Studies of Maize Crop Diseases	P-2	Practical
Unit-I	Identification of Selected Diseases and Histopathological Studies of Sorghum Crop Diseases	P-3	Practical
Unit-I	Identification of Selected Diseases and Histopathological Studies of Bajra Crop Diseases	P-4	Practical
Unit-I	Identification of Selected Diseases and Histopathological Studies of Soybean Crop Diseases	P-5	Practical
Unit-I	Identification of Selected Diseases and Histopathological Studies of Pigeon pea Crop Diseases	P-6	Practical
Unit-I	Identification of Selected Diseases and Histopathological Studies of Finger Millet Crop Diseases	P-7	Practical
Unit-I	Identification of Selected Diseases and Histopathological Studies of Castor and Tobacco Crop Diseases	P-8	Practical
Unit-I	Identification of Selected Diseases and Histopathological Studies of Guava & Banana Crop	P-9	Practical
Unit-I	Identification of Selected Diseases and Histopathological Studies of Papaya and Pomegranate Crop	P-10	Practical
Unit-I	Identification of Selected Diseases and Histo-pathological Studies of Cruciferous Vegetable Crop	P-11, 12	Practical

Unit-I	Identification of Selected Diseases and Histopathological Studies of Brinjal Crop	P-13	Practical
Unit-I	Identification of Selected Diseases and Histopathological Studies of Tomato Crop	P-14	Practical
Unit-I	Identification of Selected Diseases and Histopathological Studies of Okra crop	P-15	Practical

20017600 – Crop Improvement-I (Kharif Crops)

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fibers; fodders and cash crops; vegetable and horticultural crops	C-1	Lecture
Unit-I	Plant genetic resources, its utilization and conservation, study of genetics of qualitative and quantitative characters	C-2	Lecture
Unit-I	Class Room Assignment	C-3	Class Assignment
Unit-I	Important concepts of breeding self-pollinated, cross pollinated and vegetative propagated crops	C-4	Lecture
Unit-I	Clarification Class	C-5	Clarification Class
Unit-I	Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield	C-6	Lecture
	Home Assignment		Home Assignments
	Presentation	C-7	Presentation
Unit-I	adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional)	C-8	Lecture
	Class Room Assignment	C-9	Class Assignment
Unit-I	Hybrid seed production technology in Maize	C-10	Lecture
Unit-I	Hybrid seed production technology in Rice, Sorghum	C-11	Lecture
	Home Assignment		Home Assignments
Unit-I	Hybrid seed production technology in Pearl millet and Pigeon pea, etc.	C-12	Lecture
Unit-I	Ideotype concept and climate resilient crop varieties for future	C-13	Lecture
Unit-I	Quiz 1	C-14	Quiz
	Clarification Class	C-15	Clarification Class

20017700 –Crop Improvement-I Lab (Kharif Crops)

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Introduction to Floral Biology	P-1	Practical
Unit-I	Emasculation Techniques	P-2	Practical
Unit-I	Practical hybridization methods in Pearl millet, Ragi, Pigeonpea, and Urdbean	P-3	Practical
Unit-I	Practical hybridization methods in Mungbean, Soybean, Groundnut, and Sesame	P-4	Practical
Unit-I	Practical hybridization methods in Castor, Cotton, Cowpea, Tobacco	P-5	Practical
Unit-I	Practical hybridization methods in Brinjal, Okra, and Cucurbitaceous crops	P-6	Practical
Unit-I	Strategies and methods for maintaining genetic purity in various Kharif crops	P-7	Practical
Unit-I	Germplasm Handling	P-8	Practical
Unit-I	Field techniques for seed production in Kharif crops	P-9	Practical
Unit-I	Methods for producing hybrid seeds in selected Kharif crops	P-10	Practical
Unit-I	Practical exercises on estimating heterosis, inbreeding depression, and heritability	P-11	Practical
Unit-I	Field Experiment Layout	P-12	Practical
Unit-I	Evaluation of quality characters and identification of donor parents for different traits in Kharif crops	P-13	Practical
Unit-I	Seed Production Plot Visit	P-14	Practical
Unit-I	All India Coordinated Research Project (AICRP) Plot Visit	P-15	Practical

20018200 – Practical Crop Production – I (Kharif crops)

S. No.	Particulars	Class No.	Pedagogy of Class
Unit-I	Crop planning, raising field crops in multiple cropping systems	C-1 , 2	Lecture
Unit-I	Field preparation, seed, treatment, nursery raising, sowing, nutrient,	C-3	Lecture
Unit-I	Harvesting, threshing, drying winnowing	C-4	Lecture
	Home Assignment		Home Assignment
Unit-I	Storage and marketing of produce.	C-5	Lecture
Unit-I	The emphasis will be given to seed production, mechanization, resource conservation and integrated nutrient, insect-pest and disease management	C-6, 8	Lecture
Unit-I	Preparation of balance sheet including cost of cultivation, net returns per student	C-9	Lecture
	Clarification Class	C-10	Clarification Class
	Home Assignment-I		Home Assignment
	Classroom assignment-I	C-11	Class Assignment
Unit-I	Cultivation and management of pearlmillet	C-12	Lecture
Unit-I	Cultivation and management of wheat	C-13	Lecture
	Presentation	C-14	Presentation
Unit-I	Cultivation and management of barley	C-15	Lecture
Unit-I	Cultivation and management of mothbean	C-16	Lecture
Unit-I	Cultivation and management of moongbean	C-17	Lecture
	Clarification Class	C-18	Clarification Class
Unit-I	Cultivation and management of chickpea	C-19	Lecture
Unit-I	Cultivation and management of mustard	C-20	Lecture
Unit-I	Cultivation and management of groundnut	C-21	Lecture
	Presentation	C-22	Presentation

Unit-I	Cultivation and management of fenugreek	C-23	Lecture
Unit-I	Cultivation and management of cumin	C-24	Lecture
Unit-I	Cultivation and management of isabgol	C-25	Lecture
	Class Assignment	C-26	Class Assignment
Unit-I	Cultivation and management of cotton	C-27	Lecture
Unit-I	Cultivation and management of date palm	C-28	Lecture
	Class Assignment	C-29	Class Assignment
Unit-I	Cultivation and management of tomato	C-30	Lecture

20018300 –Intellectual Property Rights

S. No.	Particulars	Class No.	Pedagogy of Class
Unit-I	Introduction and meaning of intellectual property	C-1	Lecture
Unit-I	Types of Intellectual Property and legislations covering IPR in India:-Patents	C-2	Lecture
Unit-I	Patents Act 1970 and Patent system in India, patentability, process and product patent, filing of patent, patent specification, patent claims, Patent opposition and revocation, infringement, Compulsory licensing, Patent Cooperation Treaty, Patent search and patent database.	C-3	Lecture
Unit-I	Copyrights, Trademark, Trade secrets	C-4	Lecture
Unit-I	Clarifications Class	C-5	Clarifications Class
Unit-I	Industrial design, Integrated circuits,	C-6	Lecture
Unit-I	Geographical indications,	C-7	Lecture
Unit-I	Class Assignment	C-8	Class Assignment
Unit-I	Brief introduction to GATT, WTO, TRIPs and WIPO, Assignment 1	C-9	Lecture
Unit-I	Brief introduction to UPOV for protection of plant varieties, Protection of plant varieties under UPOV	C-10	Lecture
Unit-I	PPV&FR Act of India, Plant breeders rights, Registration of plant varieties under PPV&FR Act 2001, breeders, researcher and farmers rights	C-11	Lecture
	Home Assignment		Home Assignment
Unit-I	Convention on Biological Diversity, International treaty on plant genetic resources for food and agriculture (ITPGRFA) Assignment 2	C-12	Lecture
Unit-I	Presentation	C-13	Presentation
Unit-I	Indian Biological Diversity Act, 2002 and its salient features, access and benefit sharing	C-14	Lecture
Unit-I	Traditional knowledge-meaning and rights of TK holders	C-15	Lecture

20018400 –Ability and Skill Enhancement -V

Unit	Particulars	Class No.	Pedagogy of Class
Unit- I	What is leadership & Traits of Leadership	C 1	Lecture
Unit- I	Movie/ Story/ Interviews of leaders	C 2	Lecture
Unit- I	identifying leaders & Identify leadership qualities	C 3	Lecture
Unit- I	Debate/ Discussion/ Presentations on leaders	C 4	Presentation
Unit- I	Class Assignment	C 5	Class Assignment
Unit- I	Clarification Class	C 6	Clarification Class
Unit- II	What is Entrepreneurship, Traits of Successful Entrepreneurs	C 7	Lecture
Unit -II	Movie/ Story of Entrepreneurs	C 8	Lecture
Unit- II	Identify Entrepreneurial qualities	C 9	Lecture
Unit- II	Debate/ Discussion/Presentation on Entrepreneurs	C 10	Presentation
Unit- II	Class Assignment	C 11	Class Assignment
Unit- II	Clarification Class	C 12	clarification Class
Unit- III	What are organizational skills, how to develop them	C 13	Lecture
Unit- III	The skills needed to become a successful entrepreneur/administrator	C 14	Lecture
Unit- III	good communication, ambition, courage, hard work, planning, accountability	C 15	Lecture
Unit- III	Organizational skills can be developed by discipline making a system, rules	C 16	Lecture
Unit- III	delegation of power at workplace,	C 17	Lecture
Unit -III	PPT	C 18	Presentation
Unit-- III	How to enhance employability; skills, why do we need them,	C 19	Lecture
Unit- III	different workplaces, having different needs, different skills, how to recognize different work skills	C 20	Lecture
Unit -II	Class Assignment	C 21	Class Assignment

Unit- III	Clarification Class	C 22	Clarification Class
Unit -IV	The process of decision making, its steps, what are its basics,	C 23	Lecture
Unit- IV	what are the basics of organizational decision-making process	C 24	Lecture
Unit- IV	entrepreneurial decision making, how to make a right decision at right time, dilemma	C 25	Lecture
Unit -IV	Class Assignment	C 26	Class Assignment
Unit -IV	Clarification Class		Clarification Class
Unit -V	Conducting Interviews with Leaders/ Entrepreneurs	C 28	Lecture
Unit- V	Preparing Questions, Interviewing the fellow person, do's & don'ts while taking interview	C 29	Lecture
Unit- V	Clarification Class	C 30	Clarification Class

20018600 Geoinformatics and Nano-technology and Precision Farming (Elective)

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Precision agriculture: concepts and techniques	C-1	Lecture
Unit-I	Precision agriculture: concepts and techniques	C-2	Lecture
Unit-I	their issues and concerns for Indian agriculture	C-3	Lecture
Unit-I	their issues and concerns for Indian agriculture	C-4	Lecture
	Class Assignment	C-5	Class Assignment
Unit-I	Geo-informatics- definition, concepts, tool and techniques	C-6	Lecture
Unit-I	Geo-informatics- definition, concepts, tool and techniques	C-7	Lecture
Unit-I	Precision Agriculture	C-8	Lecture
	Classroom Assignment-II	C-9	Class Assignment
Unit-I	Crop discrimination and Yield monitoring, soil mapping	C-10	Lecture
Unit-I	Crop discrimination and Yield monitoring, soil mapping	C-11	Lecture
Unit-I	fertilizer recommendation using geospatial technologies	C-12	Lecture
	PPT	C-13	Presentation
Unit-I	Spatial data and their management in GIS	C-14	Lecture
	Home Assignment-		Home Assignment
Unit-I	Remote sensing concepts and application in agriculture	C-15	Lecture
Unit-I	Remote sensing concepts and application in agriculture	C-16	Lecture
	Quiz	C-17	Quiz
Unit-I	Clarification Class	C-18	Clarification Class
Unit-II	Image processing and interpretation	C-19	Lecture

Unit-II	Global positioning system (GPS), components and its functions	C-20	Lecture
	PPT	C-21	Presentation
	Class Assignment	C-22	Class Assignment
Unit-II	Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs	C-23	Lecture
Unit-II	Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs	C-24	Lecture
	Home Assignment		Home Assignment
Unit-II	STCR approach for precision agriculture	C-25	Lecture
	Classroom Assignment	C-26	Class Assignment
Unit-II	Nanotechnology, definition, concepts and techniques	C-27	Lecture
Unit-II	brief introduction about nanoscale effects, nano-particles, nanopesticides, nano-fertilizers, nano-sensors	C-28	Lecture
	PPT	C-29	Presentation
Unit-II	Clarification Class	C-30	Clarification Class

20018700 Geoinformatics and Nano-technology and Precision Farming Lab

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Introduction to GIS software, spatial data creation and editing	C-1	Practical
Unit-I	Introduction to GIS software, spatial data creation and editing	C-2	Practical
Unit-I	Introduction to image processing software. Visual and digital interpretation of remote sensing images	C-3	Practical
Unit-I	Introduction to image processing software. Visual and digital interpretation of remote sensing images	C-4	Practical
Unit-I	Generation of spectra profiles of different objects. Supervised and unsupervised classification and acreage estimation	C-5	Practical
Unit-I	Generation of spectra profiles of different objects. Supervised and unsupervised classification and acreage estimation	C-6	Practical
Unit-I	Multispectral remote sensing for soil mapping	C-7	Practical
Unit-I	Multispectral remote sensing for soil mapping	C-8	Practical
Unit-I	Creation of thematic layers of soil fertility based on GIS. Creation of productivity and management zones.	C-9	Practical
Unit-I	Creation of thematic layers of soil fertility based on GIS. Creation of productivity and management zones.	C-10	Practical
Unit-I	Fertilizers recommendations based of VRT and STCR techniques. Crop stress (biotic/abiotic) monitoring using geospatial technology.	C-11	Practical
Unit-I	Fertilizers recommendations based of VRT and STCR techniques. Crop stress (biotic/abiotic) monitoring using geospatial technology.	C-12	Practical
Unit-I	Use of GPS for agricultural survey. Formulation, characterization and applications of nanoparticles in agriculture. Projects formulation and execution related to precision farming	C-13	Practical
Unit-I	Use of GPS for agricultural survey. Formulation, characterization and applications of nano-particles in	C-14	Practical

	agriculture. Projects formulation and execution related to precision farming		
Unit-I	Use of GPS for agricultural survey. Formulation, characterization and applications of nanoparticles in agriculture. Projects formulation and execution related to precision farming	C-15	Practical

20018900 –Weed Management (Elective)

Unit	Particulars	Class No.	Pedagogy of Class
Unit- I	Introduction to weeds, characteristics of weeds, their harmful and beneficial effects on ecosystem	C-1	Lecture
Unit -I	Classification of weeds	C-2, 3	Lecture
Unit- I	Reproduction and dissemination of weeds	C-4	Lecture
	Clarification class-1	C-5	Clarification class
	Class room assignment-1	C-6	Class assignment
Unit- I	Herbicide classification	C-7	Lecture
	Presentation 1	C-8, 9	Presentation
Unit- I	Concept of adjuvant, surfactant, herbicide formulation and their use	C-10	Lecture
	Quiz 1	C-11	Activity
Unit -I	Introduction to mode of action of herbicides and selectivity	C-12	Lecture
Unit -I	Class assignment	C-13	Class assignment
Unit -I	Allelopathy and its application for weed management	C-14	Lecture
Unit -I	Presentation	C-15, 16	Presentation
Unit -II	Bio herbicides and their application in agriculture	C -17	Lecture
Unit -II	Concept of herbicide mixture and utility in agriculture	C-18, 19	Lecture
Unit -II	Clarification class	C-20	Clarification class
Unit -II	Quiz	C-21	Activity
Unit II	Herbicide compatibility with agro chemicals and their application	C-22	Lecture
Unit -II	Presentation	C-23, 24	Presentation
Unit II	Integration of herbicides with non chemical methods of weed management	C-25	Lecture

Unit -II	Class Assignment	C-26	Class Assignment
Unit II	Herbicide resistance and its management	C-27, 28	Lecture
Unit -II	Class Assignment	C -29	Class Assignment
Unit -II	Clarification Class	C-30	Clarification Cass

20019000 –Weed Management Lab (Elective)

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Techniques of weed preservation	C-1	Practical
Unit-I	Weed identification and their losses study	C-2, 3	Practical
Unit-I	Biology of important weeds	C-4	Practical
Unit-I	Clarification Class	C-5	Clarification Class
Unit-I	Study of herbicide formulations and mixture of herbicides	C-6, 7	Practical
Unit-I	Demonstration of techniques	C-8	Demo
Unit-I	Herbicides and agrochemical study	C-9	Practical
Unit-I	Shift of weed flora study in long term experiments	C-10	Practical
Unit-I	Class room assignment	C-11	Class assignment
Unit-I	Practical	C-12	Demo
Unit-I	Study of methods of herbicide application, spraying equipments	C-13	Practical
Unit-I	Class room assignment	C-14	Class assignment
Unit-I	Calculation of herbicide doses and weed control efficiency and weed index	C-15	Practical

20019100 Micro propagation Technologies (Elective)

Unit	Particulars	Class No.	Pedagogy of Class
Unit -I	Introduction, History of Micro-propagation	C-1	Lecture
Unit- I	Introduction, History of Micro-propagation	C-2	Lecture
Unit -I	Advantages and limitations of Micro-propagation	C-3	Lecture
Unit- I	Advantages and limitations of Micro-propagation	C-4	Lecture
	Class Assignment	C-5	Class Assignment
Unit- I	Types of cultures (seed, embryo, organ, callus, cell	C-6	Lecture
Unit -I	Types of cultures (seed, embryo, organ, callus, cell	C-7	Lecture
Unit- I	Stages of micropropagation,	C-8	Lecture
Unit- I	Class Assignment	C-9	Class Assignment
Unit- I	Stages of micro-propagation,	C-10	Lecture
Unit -I	Axillary bud proliferation (Shoot tip and meristem culture, bud cu1ture),	C-11	Lecture
Unit- I	Axillary bud proliferation (Shoot tip and meristem culture, bud cu1ture),	C-12	Lecture
Unit -I	Axillary bud proliferation (Shoot tip and meristem culture, bud cu1ture),	C-13	Lecture
Unit- II	0rganogenesis (callus and direct organ formation),	C-14	Lecture
Unit -II	0rganogenesis (callus and direct organ formation),	C-15	Lecture
Unit -II	Class Assignment	C-16	Class Assignment
Unit- II	Somatic embryogenesis,	C-17	Lecture
Unit- II	Somatic embryogenesis,	C-18	Lecture
	PPT	C-19	PPT
Unit- II	Cell suspension cultures,	C-20	Lecture
Unit -II	Cell suspension cultures,	C-21	Lecture
Unit -II	Production of secondary metabolites,	C-22	Lecture

Unit -II	Production of secondary metabolites,	C-23	Lecture
	PPT	C-24	PPT
Unit -II	Somaclonal variation,	C-25	Lecture
Unit -II	Somaclonal variation,	C-26	Lecture
Unit -II	Cryopreservation	C-27	Lecture
	Quiz	C-28	Quiz
Unit- II	Cryopreservation	C-29	Lecture
Unit -II	Cryopreservation	C-30	Lecture

20019200 Micro propagation Technologies Lab

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Identification and use of equipment's in tissue culture Laboratory, Nutrition media composition, sterilization techniques for media, containers and small instruments, sterilization techniques for explants	P-1	Practical
Unit-I	Identification and use of equipment's in tissue culture Laboratory, Nutrition media composition, sterilization techniques for media, containers and small instruments, sterilization techniques for explants	P-2	Practical
Unit-I	Identification and use of equipment's in tissue culture Laboratory, Nutrition media composition, sterilization techniques for media, containers and small instruments, sterilization techniques for explants	P-3	Practical
Unit-I	Identification and use of equipment's in tissue culture Laboratory, Nutrition media composition, sterilization techniques for media, containers and small instruments, sterilization techniques for explants	P-4	Practical
Unit-I	Preparation of stocks and working solution	P-5	Practical
Unit-I	Preparation of stocks and working solution	P-6	Practical
Unit-I	Preparation of stocks and working solution	P-7	Practical
Unit-I	Preparation of working medium, Culturing of explants: Seeds, shoot tip and single node, Callus induction	P-8	Practical
Unit-I	Preparation of working medium, Culturing of explants: Seeds, shoot tip and single node, Callus induction	P-9	Practical
Unit-I	Preparation of working medium, Culturing of explants: Seeds, shoot tip and single node, Callus induction	P-10	Practical
Unit-I	Preparation of working medium, Culturing of explants: Seeds, shoot tip and single node, Callus induction	P-11	Practical
Unit-I	Preparation of working medium, Culturing of explants: Seeds, shoot tip and single node, Callus induction	P-12	Practical
Unit-I	Induction of somatic embryos regeneration of whole plants from different explants, Hardening procedures	P-13	Practical
Unit-I	Induction of somatic embryos regeneration of whole	P-14	Practical

	plants from different explants, Hardening procedures		
Unit-I	Induction of somatic embryos regeneration of whole plants from different explants, Hardening procedures	P-15	Practical

20018000 – Bio pesticides & Bio fertilizers

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Definitions, Concepts And Classification Of Bio-pesticides	C-1	Lecture
Unit-I	Pathogen, Botanical Pesticides, And Bio-rationales.	-2	Lecture
Unit-I	Botanicals And Their Uses.	C-3	Lecture
Unit-I	Mass Production Technology Of Bio-Pesticides.	C-4	Lecture
Unit-I	Virulence, Pathogenicity And Symptoms Of Entomopathogenic Pathogens And Nematodes.	C-5	Lecture
Unit-I	Methods Of Application Of Bio-pesticides.	C-6	Lecture
Unit-I	Home Assignment		Home Assignments
Unit-I	Methods Of Quality Control And Techniques Of Biopesticides.	C-7	Lecture
Unit-I	Impediments And Limitation In Production And Use Of Bio-pesticide.	C-8	Lecture
Unit-I	Class Assignment	C-9	Class Assignment
Unit-I	Bio-fertilizers - Introduction, Status And Scope.	C-10	Lecture
Unit-II	Structure And Characteristic Features Of Bacterial Bio-fertilizers- Azospirillum, Azotobacter, Bacillus,	C-11	Lecture
Unit-II	Pseudomonas, Rhizobium And Frankia;	C1-2	Lecture
Unit-II	Cyanobacterial Bio-fertilizers- Anabaena, Nostoc, Hapalosiphon	C-13	Lecture
Unit-II	Quiz	C-14	Quiz
Unit-II	Fungal Bio-fertilizers-	C-15	Lecture
Unit-II	AM Mycorrhiza And Ectomycorrhiza.	C-16	Lecture
Unit-II	Presentation I	C-17	Presentation
Unit-II	Nitrogen Fixation -Free Living And Symbiotic Nitrogen Fixation.	C-18	Lecture
Unit-II	Mechanism Of Phosphate Solubilization and Phosphate Mobilization,	C-19	Lecture

Unit-II	K- Solubilization.	C-20	Lecture
Unit-II	Classroom Assignment	C-21	Class Assignment
Unit-II	Production Technology: Strain Selection, Sterilization,	C-22	Lecture
Unit-II	Growth And Fermentation,	C-23	Lecture
Unit-II	Mass Production Of Carrier Based And Liquid Bio-fertilizers.	C-24	Lecture
	Home Assignment		Home Assignments
Unit-II	FCO Specifications And Quality Control Of Bio-fertilizers.	C-25	Lecture
Unit-II	Application Technology For Seeds, Seedlings, Tubers, Sets Etc.	C-26	Lecture
Unit-II	Presentation II	C-27	Presentation
Unit-II	Bio-fertilizers -Storage, Shelf Life, Quality Control And Marketing.	C-28	Lecture
Unit-II	Factors Influencing The Efficacy Of Bio-fertilizers.	C-29	Lecture
Unit-II	Clarification Class	C-30	Clarification Class

20018100 –Bio pesticides & Bio fertilizers Lab

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Isolation And Purification Of Important Biopesticides: Trichoderma	P-1	Practical
Unit-I	Bacillus thuringiensis Production	P-2	Practical
Unit-I	Identification Of Important Botanicals	P-3	Practical
Unit-I	Visit To Bio-pesticide Laboratory In Nearby Area	P-4	Practical
Unit-I	Field Visit To Explore Naturally Infected Cadavers. Identification Of Entomopathogenic Entities In Field Condition	P-5	Practical
Unit-I	Quality Control Of Bio-pesticides	P-6	Practical
Unit-I	Isolation And Purification Of Azospirillum, Azotobacter, Rhizobium, P-Solubilizers	P-7	Practical
Unit-I	Cyanobacterial	P-8	Practical
Unit-I	Mass Multiplication And Inoculums Production Of Bio fertilizers	P-9	Practical
Unit-I	Isolation Of AM	P-10	Practical
Unit-I	Cyanobacterial	P-11	Practical
Unit-I	Isolation Of AM	P-12	Practical
Unit-I	Quality Control Of Bio-pesticides	P-13	Practical
Unit-I	Field Visit To Explore Naturally Infected Cadavers. Identification Of Entomopathogenic Entities In Field Condition	P-14	Practical
Unit-I	Bacillus thuringiensis Production	P-15	Practical

Note:

This is a tentative lesson plan. The same may change from faculty to faculty as per the teaching pedagogy adopted by the faculty.

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