



Karmaveer Bhaurao Patil University, Satara

Syllabus for

B. Sc. I (Plant Protection)

Under

Faculty of Science and Technology

(As per NEP 2020)

With effect from Academic Year 2024-2025

Syllabus for Bachelor of Science (B. Sc.) Part - I

PREAMBLE:

The B. Sc. Plant Protection course under autonomy will be effective from the academic year 2024 - 2025. It has been prepared to keep in view the unique requirements of B. Sc. Botany 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 botany so that they can understand and appreciate the current interdisciplinary approaches in the study of plant 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 botany, for becoming an entrepreneur, and enable students to get employed in plant-based industries.

GENERAL OBJECTIVES OF THE COURSE:

- i. To impart the knowledge of plant science is the basic objective of this course.
- ii. To develop a scientific attitude among the students and to make the students open-minded, critical, and curious.
- iii. To develop skills in practical work, experiments, and laboratory materials.
- iv. To understand scientific terms, concepts, facts, phenomenon, and their relationships.
- v. To make the students aware of natural resources and the environment.
- vi. To enable the students to acquire knowledge of plants and related subjects to understand nature and the environment for the benefit of human beings.
- vii. 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. Programme the students 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:

1. The students are expected to understand the fundamentals, principles, concepts and recent developments in the botany.
2. The practical course is framed in relevance with the theory courses to improve the understanding of the various concepts in botany.
3. It is expected to inspire and boost interest of the students in botany.
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.

PROGRAMME SPECIFIC OUTCOMES:

After completing B. Sc. (Botany) Programme the students will.....

1. Explain, discuss and answer questions related to the various aspects of plant protection and major agronomical crops
2. Gain in-depth knowledge of plant diseases, pests, and weeds, including their biology, ecology, and control methods.
3. Utilize biological, chemical, cultural, and physical control methods in a balanced approach to manage pests and diseases
4. Explain the basics of plant pathology and weed science.
5. Acquire knowledge about the different classes of pesticides, their modes of action, application techniques, and safety protocols.
6. Become skilled to enter into industries and research institutes related to plant protection.
7. Be able to set up their own business and consultancies related to protection of Plant

1. TITLE: Botany

2. YEAR OF IMPLEMENTATION: 2024 - 25

3. DURATION: 01 year

4. PATTERN: Semester examination.

5. MEDIUM OF INSTRUCTION: English

6. EVALUATION STRUCTURE:

Theory

Assessment Category	Internal Evaluation				ESE	Total Marks	Credits
	CCE-I	CCE-2	Mid Sem	Total			
Theory of 2 Credits	05	05	10	20	30	50	02

Practical

Assessment Category	Internal Evaluation		ESE	Total Marks	Credits
	Journal / Viva/Activity				
Practical of 2 Credits	20		30	50	02

7. MEDIUM OF INSTRUCTION: English

8. STRUCTURE OF COURSE:

1. Course Structure as per NEP-2020

Level	Semester	Course	DSC	OE	AEC/VEC/IKS	Total	Degree/Cum. Cr. MEME
4.5	I	I	DSC-I (2) DSC-II (2) DSC P-I (2)	2	IKS (2)	22	UG Certificate 44
		II	DSC-I (2) DSC-II (2) DSC P-I (2)				
		III	DSC-I (2) DSC-II (2) DSCP-I (2)				
4.5	II	I	DSC-I (2) DSC-II (2) DSC P-I (2)	2	VEC (2)	22	
		II	DSC-I (2) DSC-II (2) DSC P-I (2)				
		III	DSC-I (2) DSC-II (2) DSC P-I (2)				

2.

1) FIRST SEMESTER

4.

Sr. No.	Subject Title	Theory				Practical		
		Course No. & Course Code	Title of Paper	No. of lectures per week	Credits		No. of Practical Per week	Credits
1.	Plant Protection	Course – I BPPT 111	Fundamentals of Plant Pathology	4	4	Practical Course– I BPPP 113	2	2
		Course – II BPPT 112	Fundamentals of Soil Science					
2	OE	BPPTOE 118	Scientific Writing Paper I	2	2			
3	IKS		Introduction to Indian Knowledge System	2	2			

2) SECOND SEMESTER

Sr. No.	Subject Title	Theory				Practical		
		Course No. & Course Code	Title of Paper	No. of lectures per week	Credits		No. of Practical Per week	Credits
1.	Plant Protection	Course – III BPPT 121	Biofertilizer Production Technology	4	4	Practical Course– I BPPP 123	2	2
		Course – IV BPPT 122	Principles of Organic Farming					
2	OE		Scientific Writing Paper II	2	2			
3	VEC		Role of Plant Science in the Environment	2	2			

Structure and titles of Courses of B. Sc. Course

B. Sc. I Semester I

Course I BPPT 111: Fundamentals of Plant Pathology

Course II BPPT 112: Fundamentals of Soil Science

Practical Course BPPP 113: Practicals based on Courses I and II

B. Sc. I Semester II

Course III BPPT 121: Biofertilizer production technology

Course-IV BPPT 122: Principles of Organic Farming

Practical II BPPP 123: Practicals based on Courses III and IV

_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's and Chemicals:

1. All Chemicals required for plant pathological experiments
2. Microscope with a digital camera
3. Digital weighing balance
4. pH meter
5. Microtome
6. Autoclave
7. Hot Air Oven
8. Incubator
9. Refrigerator
10. Seed Dresser
- 11 Hand Refractometer

SEMESTER - I

Bachelor of Science (B. Sc.) Part - I: Plant Protection

Semester I Course I (BPPT 111) Fundamentals of Plant Pathology

Course Objectives:

The Students should be able to...

1. understand the basic knowledge about plant diseases.
2. imbibe the knowledge of effect of environmental factors on disease development.
3. gain the knowledge about principles of plant disease management.
4. impart the knowledge about management of crop diseases by IDM.

Credits (2)	Course I (BPPT 111) Fundamentals of Plant Pathology	No. of hours (30)
Unit I	Concept of Plant Diseases	(8)
	1.1 Introduction to the Science of plant pathology: Its Importance, Scope and Causes of Plant Diseases 1.2 Terminologies in Plant Pathology, Disease triangle Concept. 1.3 Symptoms and signs of plant diseases. 1.4. Dissemination of plant pathogens. 1.5 Survival of plant pathogens. 1.6 Flowering Parasitic Plants.	
UNIT II	Effect of Environmental Factors on Disease Development	(7)
	2.1 Effect of temperature moisture, rainfall, relative humidity, soil moisture, wind, light, soil pH, soil type, host-plant nutrition, pollutants. 2.2 Plant disease epidemiology: Simple interest diseases, Compound interest diseases, Slow and rapid epiphytotic.	
UNIT III	Principles of Plant Disease Management	(7)
	i) Avoidance ii) Exclusion iii) Eradication iv) Protection	

	v) Immunization vi) Therapy	
UNIT IV	Integrated Disease Management	(8)
	4.1 Definition of IDM, concept and definition of IDM. 4.2 Main components of integrated disease management (IDM). 1. Host resistance 2. Induced systemic resistance 3. Genetically improved plants 4. Physical methods, biological method, Cultural methods 5. Plant nutrition 6. Use of pesticides of plant origin 7. Judicious use of chemicals	

Course Outcomes:

The students will be able to...

1. explain effect of environmental factors on disease development.
2. get the knowledge about epidemiology.
3. apply the methods used for plant disease management.
4. gain the knowledge about use of plant originated pesticide .

Reference Books:

1. Jain V., 2009 “Laboratory Manual of Plant Pathology”. Oxford Book, Calcutta.
2. Agrios G. 2005 “Plant Pathology”. (5thEdn.), Academic Press, San Diego.
3. Aneja K., 2005. “Experiments in Microbiology Plant Pathology and Tissue Culture”. New Age International (P) Ltd. Publishers, New Delhi.
4. Bilgrami K. 1990. “Textbook of Modern Plant Pathology”. New edition, New Delhi.
5. Chattopadhyay S., 1987 “Principles and procedures of plant protection”. Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi.
6. Baruah H., 1984 “Text Book of Plant Pathology”. Oxford and IBH Publ. Co., New Delhi.
7. Mehrotra R., and Aggarwal A., 1980 “Fundamentals of Plant Pathology”. McGraw-Hill Education Pvt. Ltd., New Delhi.
8. Butler & Edwin. 1949. “Plant Pathology”. Macmillan & Co.

Plant Protection

Semester: I

Course II (BPPT 112) Fundamentals of Soil Science

Course Objectives:

The students should be able to...

1. understand the basic knowledge about soil science.
2. imbibe the knowledge of the composition of earth's crust.
3. make the students knowledgeable about the importance of rocks, soil, soil as three-dimensional body and major components of soil.
4. apply the knowledge about Soil Organic Matter, Soil pH and Nutrient Availability.

Credits(2)	Theory Course II (BPPT112) Fundamentals of Soil Science	No. of hours (30)
Unit I	Composition of Earth Crust	(7)
	1.1 Introduction 1.2 Rocks 1.3 Soil 1.4 Land and Soil 1.5 Major component of soil: 1.6 Fundamental Soil Forming Processes	
UNIT II	Soil Classification and Land Capability Classification	(8)
	2.1 Soil Classification 2.2 Soil horizons 2.3 Soil Physical Properties 2.4 Methods of textural analysis 2.4.1. Soil texture by feel method 2.4.2. Hydrometer method (Using Bouyoucos hydrometer) 2.4.3. International pipette method:	
UNIT III	Porosity and Soil Color, Soil Water Movement	(7)
	3.1 Soil Porosity 3.2 Soil Colour 3.3 Factors affecting soil colour and Porosity	

	3.4 Soil Water Movement (Saturated flow, Unsaturated flow, Vapor movement) 3.5 Measurement of Soil Moisture (Gravimetric method)	
UNIT IV	Soil Organic Matter, Soil pH and Nutrient Availability	(8)
	4.1 Introduction, Importance of organic matter 4.2 Sources of Soil Organic Matter 4.3 Introduction, Importance of Soil pH, Factors affecting soil pH 4.4 Nutrient availability	

Course Outcomes:

The students will be able to...

1. get the knowledge about the basic concepts of Composition of soil in Earth Crust .
2. describe major component and textural analysis of soil.
3. apply the methods used for measurement of soil moisture.
4. gain the knowledge about the soil organic matter, nutrients and carry out practical work in field

Reference Books:

1. Plaster, E., 2013. Soil science and management. Cengage learning.
2. Tan, K.H., 2009. Environmental soil science. CRC Press.
3. Havlin J.L., Beaton J.D., Tisdale S.L., & Nelson W.L., 2006. Soil Fertility and fertilizers. 7th Ed. Prentice Hall.
4. Brady N.C. & Weil R.R., 2002. The Nature and Properties of Soils. 13th Ed. Pearson Edu.
5. Yawalkar K.S, Agrawal J.P. & Bokde S., 2000. Manures and Fertilizers. Agri-Horti Publ
6. Prasad R., & Power J.F., 1997. Soil Fertility Management for Sustainable Agriculture. CRC Press.
7. Leeper, G.W., Uren, N. C., 1993. Soil science: an introduction. Melbourne University Press.
8. Foth, H. D., 1951. Fundamentals of soil science. United States of America

Plant Protection

Semester I

Practical Course -I (BPPP 113)

Course Objectives:

The Students should be able to...

- 1) familiarize the students with general plant pathological equipment's and pathological procedures (Preparation of culture media, About GM crops, IDM, etc.)
- 2) learn the preparation of Soil Samples for laboratory analysis.
- 3) understand the relationship between the parasitic plants and their host .
- 4) impart the knowledge about integrated disease management .

Credits (2)	Practical Course- I (BBPP 113) (Practicals based on Theory Courses I and II)	No. of hours 60
	<ol style="list-style-type: none">1. Study of general plant pathological equipment's like compound microscope, autoclave, laminar air flow, incubators and hot air oven.2. Study of Symptoms and signs of plant diseases caused by Bacteria, Viruses, MLO's and fungal pathogens.3. Study the characteristics of parasitic flowering plants and their relationship with their hosts.4. Study of Preparation of culture media and sterilization.5. Study of pesticides with plant origin.6. Study of GM plants.7. Study of types of Integrated Disease Management (Integration of	

	<p>cultural and chemical control, Integration of chemical and biological control, Integration of resistance, cultural, biological and chemical control).</p> <p>8. Study of collection and preparation of Soil Samples for laboratory analysis.</p> <p>9. Determination of Soil colour and its classification of given Soil samples.</p> <p>10. Determination soil moisture content from given soil samples.</p> <p>11. Determination of Soil pH of given soil samples.</p> <p>12. Determination of Electrical Conductivity (EC) of given Soil samples.</p> <p>13. Determination particle size analysis of given Soil samples.</p> <p>14. Determination of total N, P, K in soil samples.</p> <p>15. Study of Management of Soil health.</p>	
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Course Outcomes:

The students will be able to...

- 1) learn and use all plant pathological procedures (Preparation of culture media, About GM crops, IDM, etc.)
- 2) demonstrate the methods used for preparation of Soil Samples in laboratory.
- 3) apply the different methods for disease management.
- 4) identify the types of soil by using methods for soil analysis.

Reference Books:

1. Jain V., 2009. "Laboratory Manual of Plant Pathology". Oxford Book, Calcutta.
2. Havlin J., Beaton J., Tisdale S., & Nelson W., 2006. "Soil Fertility and fertilizers". 7th Ed. Prentice Hall.
3. Agrios G., 2005. "Plant Pathology". (5thEdn.), Academic Press, San Diego.
4. Aneja K., 2005. "Experiments in Microbiology Plant Pathology and Tissue Culture". New Age International (P) Ltd. Publishers, New Delhi.
5. Brady N., & Weil R., 2002. "The Nature and Properties of Soils". 13th Ed. Pearson Edu.
6. Yawalkar K., Agrawal J., & Bokde S., 2000. "Manures and Fertilizers". Agri-Horti Publ.
7. Prasad R., & Power J., 1997. "Soil Fertility Management for Sustainable Agriculture". CRC Press.
8. Mehrotra R., and Aggarwal A., 1980. "Fundamentals of Plant Pathology". McGraw-Hill Education Pvt. Ltd

Bachelor of Science (B. Sc.) Part - I: Plant Protection

Semester I

Subject- BPPTOE 118: Scientific Writing Paper I

Course Objectives:

Students should be able to ...

1. understand the scientific vocabulary development
2. learn common errors
3. build the scientific vocabulary
4. explore the use of dictionary and thesaurus

Unit No	Contents of Unit	No. of hours per unit/ credits-2
Unit -I	Introduction to Scientific Vocabulary development Definition, importance of scientific vocabulary development, ways to develop scientific vocabulary	07
Unit -II	Word building and Common errors in vocabulary Root words, Base words , word building , Prefix, suffix, Synonym, Antonym, Homonym Common errors, Confusing words, Spelling, reasons of common errors, techniques to avoid errors	8
Unit -III	Scientific vocabulary Scientific vocabulary, common scientific words, techniques to remember scientific words	7
Unit -IV	Use of Dictionary and thesaurus Purpose, Types of dictionaries, difference between dictionary and thesaurus, improving study skills by using dictionary	8

Course Outcomes:

Students will be able to...

1. improve scientific vocabulary
2. avoid common errors
3. build the scientific vocabulary
4. use dictionary and thesaurus

References:

1. Andrea J., “ Basic Communication Skills for Technology”, Pearson, 2007
2. Das Bikaram K. First edition , Samantray Kalyani, Pani usmita, Mohanti Saveeta,
3. An Introduction to Professional English and Soft Skills, Cambridge University Press India PVT. Ltd. New Delhi,
4. Rizvi, M Ashraf, 2009 first edition, “Effective Technical Communication”, McGraw Hill, New Delhi
5. Quirk & Randolph, 2006, first edition, “ A University Grammar of English”, Pearson, New Delhi

Bachelor of Science (B. Sc.) Part - I: Botany (BPPIKS)

Semester I

Subject- Introduction to Indian Knowledge System

Course Objectives:

Students should be able to ...

1. understand the concept of Indian Knowledge system
2. study the various Indian Art and Culture and their influence
3. know the heritage of Indian Science and Technology
4. learn the global influences of IKS

Unit No	Contents of Unit	No. of hours per unit/ credits-2
Unit -I	Fundamentals of Indian Knowledge System 1.1 Definition, Concept and Scope of IKS 1.2 Overview of Indian Knowledge systems 1.3 IKS based approaches on knowledge paradigms 1.4 Applications of Indian knowledge systems in modern times	07
Unit -II	Indian Art and Culture 2. 1 Overview of Indian Art and Culture 2.2 Tribal art and culture 2.3 Folk art and craft traditions 2.4 Influence of Indian Art on western art movements	08
Unit -III	Indian Science and Technology in IKS 3.1 Indian Science and Technology Heritage 3.2 Case studies of Indian Scientists and technologists 3.3 Applications of Indian Science and technology in modern times 3.4 Relevance of Indian Science and technology in global context	08
Unit -IV	Indian Knowledge Systems : Global Influence 4.1 Contemporary global interest in Indian culture and spirituality 4.2 Indian influence on development of various sciences. 4.3 Case studies of scientists influenced by ancient Indian knowledge systems 4.4 Relevance of Indian Knowledge systems in addressing global challenges.	07

Course Outcomes:

Students should be able to ...

1. explain the concept of Indian Knowledge system
2. identify the various Indian Art and Culture and their influence
3. recognize the heritage of Indian Science and Technology
4. describe the global influences of IKS

References:

1. Avari, B. 2016. India: The Ancient Past: A History of the Indian Subcontinent from c. 7000 BCE to CE 1200. London: Routledge

2. Nair, Shantha N. *Echoes of Ancient Indian Wisdom*. New Delhi: Hindology Books, 2008
3. DK Chakkrabarty, Makkhan Lal, *History of Ancient India (Set of 5 Volumes)*, Aryan book International publication, 2014
4. Jha Amit, *Traditional knowledge system in India*, Atlantic Publisher
5. Potter, K.H. *Encyclopaedia of Indian Philosophies*, Vol.III. Delhi: Motilal Banarasadass, 2000
6. Kapur K and Singh A.K (Eds) 2005). *Indian Knowledge Systems*, Vol.
 1. Indian Institute ofAdvanced Study, Shimla. *Tatvabodh of sankaracharya*, Central Chinmay mission trust, Bombay, 1995
7. Satprakashananda. *The Methods of Knowledge according to Advaita Vedanta*. Calcutta:Advaita Ashram, 2005
8. Singhanian Nitin, 5th Edition 2022 *Indian Art and Culture*, McGraw Will Publication: UP

SEMESTER - II

Bachelor of Science (B. Sc.) Part - I: Plant Protection

Semester II

Course III (BPPT 121)

Biofertilizer Production Technology

Course Objectives:

The students should be able to...

1. know the basic knowledge about Biofertilizers.
2. understand the knowledge about the mass culturing of biofertilizers.
3. impart the knowledge about the culture of bacterial and fungal biofertilizers.
4. learn the knowledge about botanical and fungal biopesticides.

Credits (2)	Course III (BPPT 121) Biofertilizer Production Technology	No. of hours (30)
Unit I	Introduction to Biofertilizers	(8)
	1.1 Introduction, definition, importance and advantages. 1.2 Classification of biofertilizers, sources of biofertilizers- Bacteria, Cyanobacteria Mycorrhiza 1.3 Outlines of production technology of biofertilizers- isolation, selection of strain, preparation of mother culture, starter culture, mass culturing. 1.4 Rhizobium Mass multiplication, starter culture, mass cultivation, inoculant formulations and application method.	
UNIT II	Culture of Bacterial and fungal Biofertilizers	(7)
	2.1 <i>Azotobacter</i> - Mass multiplication, maintenance of culture, application and crop response. 2.2 <i>Azospirillum</i> - Mass multiplication, inoculant formulations, associative effect and crop response. 2.3 <i>Anabaena</i> - Characteristics, <i>Azolla</i> -, <i>Anabaena</i> association, <i>Azolla</i> production and application. 2.4 VAM-massproduction-substrate, substrate free, in-vitro methods and crop response.	
UNIT III	Biofertilizer Production Technology	(8)
	3.1 PSM: Isolation, mass inoculum production and field application.	

	<p>3.2 Culturing of microorganisms: Fermentation Method- Bioreactor and protocol.</p> <p>3.3 Inoculant formulations: Carrier properties, Types of formulations: Powders, Granules and Liquids.</p> <p>3.4 Quality Management of biofertilizers</p>	
UNIT IV	Botanical and fungal biopesticides	(7)
	<p>4.1 Biological control agents and their characteristics.</p> <p>4.2 Types of biopesticides– bacterial, fungal and viral ; advantages and disadvantages.</p> <p>4.3 Properties of botanical biopesticides; pesticide products in <i>Azadirachta, Pongamia and Annona</i>.</p> <p>4.4 Characteristics of biological fungicides- <i>Trichoderma, Pseudomonas</i> and <i>Fusarium</i> species; production and processing of biological fungicides</p>	

Course outcome:

The students will be able to...

1. discuss about the importance of biofertilizers.
2. realize the importance of ecofriendly fertilizers and pesticides.
3. demonstrate skills on culture and mass production of biofertilizers and biopesticides.
4. study the efficacy of biofertilizers and biopesticides in organic farming.

Reference Books:

1. Burges Horace D., 2012. Formulation of microbial biopesticides: beneficial microorganisms, nematodes and seed treatments. Springer Science & Business Media.
2. Khater Hanem Fathy 2012. "Prospects of botanical biopesticides in insect pest management." Pharmacologia 3, no. 12: 641-656.
3. Saleem F. and Shakoori A.R., 2012. Development of Bio insecticide. Lambert Academic Publishing, Latvia, European Union.
4. Mahendra K. R., 2005. Hand book of Microbial biofertilizers. The Haworth Press, Inc. New York.
5. Board N. I. I. R. 2004. The complete technology book on bio fertilizer and organic farming. National Institute of Industrial Re.
6. Kannaiyan S., 2003. Biotechnology of Biofertilizers. CHIPS, Texas.
7. Reddy S.M., 2002. Bio inoculants for sustainable agriculture and forestry. Scientific Publishers, Jodhpur.
8. Subba Rao N.S., 1995. Soil microorganisms and plant growth. Oxford and IBH publishing co. Pvt. Ltd. New Delhi.

Plant Protection

Course IV (BPPT 122) Principles of Organic Farming

Course Objectives:

The students should be able to...

1. understand the basic knowledge about organic farming.
2. acquire the knowledge of land and water management for organic farming
3. impart the knowledge about factors responsible for land degradation
4. explain the knowledge about importance of biofertilizers.

Credits(2)	Course IV(BPPT 122) Principles of Organic Farming	No. of hours per unit/ credits
Unit I	Introduction to Organic Farming	(8)
	Organic Farming: 1.1 Definition, concept, principles, Need of organic farming and its Scope in India. 1.2 Advantages and disadvantages of organic farming 1.3 Types of organic farming, Benefits and limitations of organic farming. 1.4 Initiatives taken by the central and state governments, NGOs and other organizations for promotion of organic agriculture in India.	
Unit II	Fundamentals of organic farming	
	2.1 Fundamental organic farm management. 2.2 Land management in organic farming. 2.3 Water management in organic farming.	
Unit III	Management of Waste Land and Problematic soil	(7)
	3.1 Factors responsible for land degradation and characteristics of different types of wastelands 3.2 Saline and sodic soils– Occurrence, classification, formation, diagnosis characteristics and management 3.3 Acid Soils–Occurrence, formation, diagnosis, characteristics and management. 3.4 Waterlogged soils–Occurrence, characteristics and management. Eroded soils: Occurrence characteristics and management.	

UNIT IV	Biofertilizers	(8)
	3.1 Introduction, types, importance, History of biofertilizers production, advantages of biofertilizers.	
	3.2 Sources of biofertilizers –Bacteria, Cyanobacteria, Mycorrhiza, Methods of Composting	
	3.3 Vermicomposting, green manuring; types, advantages and Dis-advantages and nutrient availability.	
	3.4 Preparation of FYM, composts, different methods of composting, decomposition process	

Course Outcomes:

The students will be able to...

1. describe the benefits and types of organic farming.
2. explain importance of land management in organic farming.
3. realize the importance of soil for organic farming .
4. apply the knowledge about preparation of biofertilizers .

Reference Books:

- 1) Gopal Chandra De., 1980. "Fundamentals of Agronomy". Oxford and IBH Publishing Co. Ltd., Bangalore.
 - 2) Panda S., 2006. "Agronomy". Agribios Publication, New Delhi.
 - 3) Reddy S., 2011. "Principles of Agronomy". Kalyani Publishers, Ludhiana, India.
 - 4) Sankaran S. and Subbiah M., 1991. "Principles of Agronomy". The Bangalore Printing and Publishing Co. Ltd., Bangalore.
 - 5) Rao V., 2006. "Principles of Weed Science". Oxford and IBH Publishing Co., New Delhi, India.
 - 6) Lockeretz William, ed., 2007. Organic farming: an international history. CABI.
 - 7) Young, Anthony 1997. Agroforestry for soil management. No. Ed. 2. CAB international.
- Brown Kirk W., Gordon B.E., and Beth D. F., 1983. "Hazardous waste land treatment

Plant Protection Semester: II

Practical Course II (BPPP 123)

Course Objectives:

The students should be able to...

1. imparts knowledge about production of bio-fertilizers.
2. familiarize with of preparation methods for vermi composting, vermiwash, Biofertilizers.
3. understand the knowledge identification of biological control agent.
4. apply the preparation method of biopesticide.

Credits (2)	Practical Course II (BPPP 123) Practicals based on Course III and IV	No. of hours per unit/credits 60 Hrs.
	<ol style="list-style-type: none">1. Study of equipment for production of bio-fertilizers.2. Study of Isolation and culture techniques of 3 types of biofertilizers as per the theory syllabus.3. Study of Characteristics, isolation and identification of Rhizobium, Azatobacter and Azospirillum.4. Study of VAM-isolation and inoculum production.5. Study of Identification of biological control agents.6. Study of Isolation and culture of <i>Trichoderma</i>, <i>Pseudomonas</i> and <i>Fusarium species</i>.7. Study of Isolation and culture of <i>Bacillus thuringiensis</i>, <i>Metrhizium</i>, <i>Beauvaria basina</i>.8. Study of Demonstration of application equipment's for biopesticides.9. Study of Calculations of dosage and application technique of biopesticides.10. Study of different types of biofertilizers as per theory syllabus.11-12. Study of preparation methods for vermicomposting, vermiwash.13. Study of preparation methods for Enriched compost.14. Study of biological control agents and their characteristics.15. Preparation of botanical / fungal pesticides.	

Course outcomes:**The students will be able to...**

1. acquire the knowledge about equipment's and production, quality of various biofertilizers.
2. understand the knowledge about preparation of enriched compost and botanical pesticides.
3. discuss about the inoculation and isolation of VAM.
4. apply the equipment's for preparation of biopesticides.

Reference Books:

1. Burges, Horace Denis 2012. Formulation of microbial biopesticides: beneficial microorganisms, nematodes and seed treatments. Springer Science & Business Media.
2. Saleem F., and Shakoori A., 2012. "Development of Bio insecticide". Lambert Academic Publishing, Latvia, European Union.
3. Reddy S., 2011. "Principles of Agronomy". Kalyani Publishers, Ludhiana, India.
4. Panda S., 2006 "Agronomy". Agribios Publication, New Delhi.
5. Rao V., 2006. "Principles of Weed Science". Oxford and IBH Publishing Co., New Delhi, India.
6. Reddy S., 2002. "Bio inoculants for sustainable agriculture and forestry". Scientific Publishers, Jodhpur.
7. Rai, Mahendra, ed. 2006. Handbook of microbial biofertilizers. CRC Press.
8. Subba Rao N., 1995. "Soil microorganisms and plant growth". Oxford and IBH publishing co. Pvt. Ltd. New Delhi.

Bachelor of Science (B. Sc.) Part - I: Plant Protection (OE)

Semester II

Subject- BPPTOE2 : Scientific Writing Paper II

Course Objectives:

Students should be able to ...

1. Develop writing skills
2. Understand writing process
3. Learn grammar and punctuation
4. Organize a paragraph

Unit No	Contents of Unit	Credit Assigned
Unit -I	Introduction to writing skills Writing , Basics of writing: pre-writing, drafting, and editing	07
Unit-II	Writing Process research, planning and outlining, editing, revising, spelling and grammar, and organization ,	8
Unit-III	Grammar and Punctuation marks Basic sentence patterns, types of sentences, Punctuation marks, Capitalization, Spelling rules	07
Unit-IV	Organizing a paragraph Organizing principles of paragraph, topic sentence, logical linking, structure , formats	08

Course Outcomes:

Students will be able to...

1. writing effectively
2. Understand writing process
3. avoid grammar and punctuation errors
4. organize a paragraph

References:

1. Das Bikaram K. First edition , Samantray Kalyani, Pani usmita, Mohanti Saveeta, An Introduction to Professional English and Soft Skills, Cambridge University Press India PVT. Ltd. New Delhi
Quirk & Randolph, 2006, first edition, “ A University Grammar of English”, Pearson, New Delhi

Bachelor of Science (B. Sc.) Part – I Plant Protection

Semester-II

BBT-VEC-I: Role of Values and Ethics in Plant Sciences

Course Objectives: The students should be able to:

1. understand the universal human values.
2. relate that universal human values are integrated in plant sciences as well.
3. know importance of gender equity.
4. correlate knowledge of cultural heritage with plant sciences.

Credits (02)	Contents of Unit	No. of hours per unit
Unit I	Universal Human values	07
	Truth, Harmony, Compassion and Justice	
Unit II	Ethical conduct and Ethical reasoning in Plant Sciences	08
	2.1 Concept of ethical conduct and ethical reasoning	
	2.2 Examples to differentiate social ethics and ethical reasoning	
	2.3 Importance of ethics and values in plant sciences	
	2.4 Famous case studies highlighting consequences of ethical misconduct in plant sciences	
Unit III	Importance of Gender Equity in Plant Sciences	08
	3.1 Concept of gender, gender divide and gender equity	
	3.2 Gender participation status in plant sciences	
	3.3 Significance of gender equity in the development of plant sciences	
	3.4 Case studies highlighting the direct and indirect achievements of females in plant sciences	
Unit IV	Importance of culture and heritage in the development of Plant Sciences	07
	4.1 Concept of culture and heritage, Integration of plant sciences with culture and heritage	
	4.2 Enrichment of plant sciences by cultural and heritage diversity	
	4.3 Conservation of cultural heritage as an integral part of plant sciences	
	4.4 Applications of cultural and inherited knowledge in present day scenario of plant sciences	

Course Outcomes: The students will be able to:

1. explain the universal human values
2. discuss concepts related to ethical values and ethical reasoning.
3. discuss the importance of gender equity in academics.
4. Compare and analyze the importance of culture and heritage in development of plant sciences.

References Books:

1. https://fdp-si.aicte-india.org/download/HVBE_for_NEP2020.pdf