SHIVAJI UNIVERSITY, KOLHAPUR - 416 004,
MAHARASHTRA
www.unishivaji.ac.in, bos@unishivaji.ac.in
शिवाजी विद्यापीठ, कोल्हापूर - ४१६ ००४,महाराष्ट्र
दूरध्वनी - ईपीएबीएक्स - २६०९०००, अभ्यासमंडळे विभाग दुरध्वनी ०२३१—२६०९०९३/९४

Estd. 1962
"A++" Accredited by NAAC(2021)
With CGPA 3.52

SU/BOS/Science/481 **Date: 01/07/2023**

To,

The Principal, All Concerned Affiliated Colleges/Institutions Shivaji University, Kolhapur	The Head/Co-ordinator/Director All Concerned Department (Science) Shivaji University, Kolhapur.

Subject: Regarding syllabi of B.Sc. Part-II (Sem. III & IV) as per NEP-2020 degree programme under the Faculty of Science and Technology.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the revised syllabi, nature of question paper and equivalence of B.Sc. Part-II (Sem. III & IV) as per NEP-2020 degree programme under the Faculty of Science and Technology.

B.Sc. Part-II (Sem III & IV) as per NEP-2020			
1.	Mathematics	8.	Chemistry
2.	Statistics	9.	Sugar Technology (Entire)
3.	Physics	10.	Microbiology
4.	Astrophysics	11.	Industrial Microbiology
5.	Zoology	12.	Electronics
6.	Botany	13.	Geology
7.	Plant Protection		

This syllabus, nature of question and equivalence shall be implemented from the academic year 2023-2024 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website **www.unishivaji.ac.in**)

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October /November 2023 & March/April 2024. These chances are available for repeater students, if any.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Dy Registrar
Dr. S. M. Kubal

Copy to:

1	The Dean, Faculty of Science & Technology	8	P.G. Admission/Seminar Section
2	Director, Board of Examinations and Evaluation	9	Computer Centre/ Eligibility Section
3	The Chairman, Respective Board of Studies	10	Affiliation Section (U.G.) (P.G.)
4	B.Sc. Exam/ Appointment Section	11	Centre for Distance Education

SHIVAJI UNIVERSITY, KOLHAPUR.

Accredited By NAAC with 'A^{++}'Grade

Revised Syllabus For

B. Sc. II Plant Protection

(Faculty of Science & Technology)

Paper –I, II-(Semester-III)

and

Paper-III, IV-(Semester-IV)

(NEP-2020) CBCS Syllabus to be implemented from June, 2023 onwards

A] Ordinance and Regulations: (As applicable to Degree Course)

B] Shivaji University, Kolhapur

Revised syllabus for Bachelor of Science

1. **TITLE:** Subject-Plant Protection
   Optional under the Faculty of Science

2. **YEAR OF IMPLEMENTATION**: -Revised Syllabi (As per NEP 2020) will be implemented from June2023 onwards.

3. **PREAMBLE: -**

   [Note: - The Board of Studies should briefly mention foundation, core and applied components of the course/paper. The student should get into the prime objectives andexpectedlevelofstudywithrequiredoutcomeintermsofbasicandadvanceknowledgeat examination level.**]**

4. **GENERAL OBJECTIVES OF THE COURSE:(as applicable to the Degree concerned) Objectives: -**

   1) To impart knowledge of Science is the basic objective of education.
   2) To develop scientific attitude is the major objective to make the students open minded, critical, curious.
   3) To develop skill in practical work, experiments and laboratory materials and equipments along with the collection and interpretation of scientific data to contribute the science.
   4) To understand scientific terms, concepts, facts, phenomenon and their relationships.
   5) To make the students aware of natural resources and environment.
   6) To provide practical experience to the students as a part of the course to develop scientific ability to work in the field of research and other fields of their own interest and to make them fit for society.
   7) The students are expected to acquire knowledge of plant and related subjects so as to understand natural phenomenon, manipulation of nature and environment in the benefit of human beings.
   8) To develop ability for the application of the acquired knowledge to improve agriculture and other related fields to make the country self-reliant and sufficient.
   9) To create the interest of the society in the subject and scientific hobbies, exhibitions and other similar activities.

5. **DURATION**

   The course shall be a full time course.

6. **PATTERN: -**

   Pattern of Examination will be Semester.

7. FEESTRUCTURE: -

As per Government/University rules

1. Refer brochure and prospectus of concern affiliated college/institute to Shivaji University, Kolhapur.
2. Other fee will be applicable as per rules and norms of Shivaji University, Kolhapur.

8. ELIGIBILITY FOR ADMISSION:

As per guidelines obtained from Shivaji University, Kolhapur by following rules and regarding reservations by Govt. of Maharashtra

9. MEDIUM OF INSTRUCTION:

The medium of instruction shall be in English.

10. STRUCTURE OF THE COURSE-B. Sc. II Plant Protection

SECONDY EAR (SEMESTER III/IV) (NO. OF PAPERS 4)

Sr. No.	Subjects/Papers	Theory	Internal	Total Marks
1.	Paper-I	40	10	50
2.	Paper-II	40	10	50
3.	Paper-III	40	10	50
4.	Paper-IV	40	10	50
	Practical-I			50
	Practical-II			50
Total				**300**

11. SCHEME OF TEACHING AND EXAMINATION: -

[The scheme of teaching and examination should be given as applicable to the course/paper concerned.]

SECOND YEAR-SEMESTER–III/IV: Plant Protection (Optional)

Scheme of Teaching and Examination

Sr .No.	Subject/Paper	Teaching Scheme (Hrs/ Week)				Examination Scheme (Marks)		
		L	T	P	Total	Theory	Term Work	Total
	Semester-III							
1	Paper-I	03	-	-	03	40	10	50
2	Paper-II	03	-	-	03	40	10	50
	Semester-IV							
3	Paper-III	03	-	-	03	40	10	50
4	Paper-IV	03	-	-	03	40	10	50
	Practical-I(annual)	-	-	04	04	-	-	50
	Practical-II(annual)	-	-	04	04	-	-	50
	Total	06	-	08	14	-	-	300

12. SCHEME OF EXAMINATION: -

- The examination shall be conducted at the end of each term for semester pattern.
- The theory paper shall carry 40 marks.
- The evaluation of the performance of the students in theory papers shall be on the basis of Semester Examination of 40 marks.
- The internal evaluation for each paper shall carry 10 marks. (Semester III -Group activity and Semester IV- Case study/ Oral examination.)
- Question paper will be set in the view of the/in accordance with the entire syllabus and preferably covering each unit of syllabi.

13. STANDARD OF PASSING: -

As Prescribed under rules and regulation for each degree.

14. NATURE OF QUESTION PAPER AND SCHEME OF MARKING:

Q.1. Multiple choices questions (8-questions)--- 8 Marks

Q.2.Attempt **any two** of the following.

(Essay type/ Broad answer questions) ---- 16 Marks

Q.3Write short notes (**any four**) --- 16 Marks

15. EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OFPAPERS- (FOR REVISED SYLLABUS)

(Introduced from June2023onwards)

Old Syllabus (Semester pattern)		Revised Syllabus (Semesterpattern)		
Paper No.	**Title of Old Paper**	**Semester No.**	**Paper No.**	**Title of New Paper**
I	Major Crops, methods of integrated plant protection	III	I	Introduction to Plant Protection and Study of Major Crops
II	Insect pests and their management		II	Plant Pathology
III	Introduction to weeds and their management	IV	III	Introduction to Weeds and Weed Management
IV	Crop disease their management and pathophysiological skills		IV	Insect Pests, Non-Insect Pests and Their Management

16. SPECIAL INSTRUCTIONS, IFANY

SEMESTER III

PLANT PROTECTION PAPER – I (DSC IC 45): INTRODUCTION TO PLANT PROTECTION AND STUDY OF MAJOR CROPS

CREDITS: 2, LECTURE PERIOD: 3 PER WEEK

LECTURE HOURS:3 PER WEEK, MARKS: 50

UNIT	SUBUNIT	TOPIC	LECTURE PERIOD
1	**INTRODUCTION TO PLANT PROTECTION**		**15**
1	**1 a. Introduction to plant protection and Major crops (Cereal crop, Pulse crop, Tuber Crop, Sugar crop, Oil crop)**	**1.1 Introduction and importance of plant protection.** **1.2 Introduction to agronomic crops: Study of following crops with reference to gross morphology, soil type, climatic conditions, planting materials and methods, irrigation, fertigation, yield, varieties** a. Cereal crop: Jowar b. Pulse crop: Chick pea c. Tuber crop: Potato d. Sugar crop: Sugarcane e. Oil crop: Groundnut	07
	1 b. Fruit crop, Vegetable crop, Spice crop, Flower crop	**1.3 Study of following crops with reference to gross morphology, soil type, climatic conditions, planting materials and methods, irrigation, fertigation, yield, varieties and economic importance.** a. Fruit crop: Mango b. Vegetable crop: Brinjal c. Spice crop: Chili d. Fibre crop: Cotton e. Flower crop: Rose	08
2	**METHODS OF PLANT PROTECTION**		**15**
	2 a. Methods of plant protection	**2.1 General methods of plant protection:** **i) Cultural methods:** Tillage, Crop rotation, Trap crops, Fertilizer applications. **ii) Mechanical methods:** Field sanitation, Hand picking, Destruction of egg masses, Light traps, Sticky bags, Bagging for the insects. **iii) Physical methods:** Heat and Soil solarization	8
	2b. Advances	**2.2 Organic farming:** Principles and its scope	7

	in agricultural practices	**2.3 Green manuring:** Introduction, Advantages and Types- a. Leguminous green manures: e.g., *Crotalaria juncea* b. Cover crops: e.g., *Brassica juncea*. **2.4 Biofertilizers:** Introduction, Advantages and Types- a. Bacterial biofertilizers, e.g., *Rhizobium*, b. Fungal biofertilizers: e.g., VAM c. Algal biofertilizers: e.g., *Nostoc.* **2.5 Organic fertilizers:** Vermicompost and Vermiwash **(**Introduction, Advantages.) **2.6 Biopesticides:** Introduction, Advantages and Types- a. Microbial pesticides b. Biochemical pesticides: Botanicals c. Plant incorporated protectants (PIPS) e.g., c*ry* gene from *Bacillus thuringiensis*.	
		TOTAL LECTURES	**30**

SEMESTER III

PLANT PROTECTION PAPER – II (DSC IC 46): PLANT PATHOLOGY

CREDITS: 2, LECTURE PERIOD: 3 PER WEEK

LECTURE HOURS: 3 PER WEEK, MARKS: 50

Unit	Subunit	TOPIC	PERIODS LECTURES
1	**INTRODUCTION TO PLANT DISEASES**		**15**
	1 a. Concept of Plant Disease	**1.1 Definition and concept of disease, Terminologies in Plant Pathology:** Host, pathogen, pathogenicity, pathogenesis, symptoms, infection, incubation period, Etiology, susceptibility, immunity, hypersensitivity, resistance. **1.2 Classification of plant diseases –** Based on a. **Cause of the disease:** e.g., non-infectious disease and infectious disease b. **Causal organism:** e.g., Nematodal diseases, Viral diseases, Mycoplasmal diseases, Bacterial diseases, Fungal diseases, Algal diseases, Parasitic flowering plants. c. **Symptoms:** e.g., Rust, Smut, Canker, Mosaic, Anthracnose, Wilting, Die-back, Damping off, Blight and Mildew. d. **Mode of spread of pathogen:** e.g., Soil borne, Seed borne, Air borne and vector borne diseases. **1.3 Mechanism of infection:** a) Penetration b) Host pathogen interaction c) Factors governing the process of infection.	07
	1 b. Study of Plant Diseases	**1.4 Study of following plant diseases with reference to symptoms, pathogen, disease cycle and their management.** **A. Infectious diseases** a) **Mycoplasmal disease:** Grassy shoot disease of sugarcane b) **Viral disease:** Yellow vein mosaic of bhendi c) **Bacterial disease:** Guava fruit canker	08

		d) **Fungal disease:** i. Rust of Soybean, ii. White rust of *Amaranthus*, iii. Grain smut of jowar, iv. Tikka disease of ground nut B. **Non infectious disease:** Introduction, Example (with respect to symptoms, causal abiotic factor, symptoms, remedy) e.g., Black heart of potato	
2	**PLANT DISEASE CONTROL**		**15**
	2 a. Principles of Plant Disease control	**2.1 Introduction** **2.2 Disease control through Resistance-** a) Disease escape b) Disease endurance or tolerance c) Natural devices for resistance- **i) Protective:** Structural modifications, Production of toxic chemical substances, Stimulant deficiency, Absence of antigen. **ii) Defensive:** Histological modifications (Formation of cork layers, Abscission layers, Tyloses, Callus formation, Gum secretion).	8
	2 b. Management of Plant Diseases	**2.3 Disease control through cultural practices:** e.g., Crop rotation, Intercropping, Drying, Ageing and cleaning of the seeds, Thermal treatment to seeds, Shallow planting. **2.4 Biological control** **2.5 Plant Quarantine Organization in India** **2.6 Chemical control-** Fungicides: Study with reference to properties, mode of action and uses of -Bordeaux mixture and Carbendazim.	7
	TOTAL LECTURES		**30**

SEMESTER IV

PLANT PROTECTION PAPER III (DSC ID 45): INTRODUCTION TO WEEDS AND WEED MANAGEMENT

CREDITS: 2, LECTURE PERIOD: 3 PER WEEK

LECTURE HOURS: 3 PER WEEK, MARKS: 50

UNIT	SUB UNIT	TOPIC	PERIOD LECTURE
1	**INTRODUCTION TO WEEDS**		**15**
	1a. Introduction to Weeds	**1.1 Weeds – Definition and losses caused by weeds.** **1.2 Classification of weeds based on** a) Ontogeny b) Ecology c) Crop association **1.3 Reproduction and mode of dispersal of weeds.** **1.4 Study of parasitic weeds-** **a) Root parasite:** Total root parasite (*Orobanche* sp.), Partial root parasite (*Striga* sp.) **b) Stem parasite:** Total stem parasite (*Cuscuta* sp.), Partial stem parasite (*Dendrophthoe* sp.)	7
	1 b. Study of Weeds	**1.5 Study of following weeds with reference to** **a) Gross morphology b) Reproduction c) Ecology d) Dispersal and e) Management** A. Dicot Weeds i. *Parthenium hysterophorus* ii. *Ageratum conyzoides* iii. *Alternanthera sessilis* iv. *Boerhavia erecta* B. Monocot Weeds v. *Cyperus rotundus* vi. *Cynodon dactylon* vii. *Chloris barbata* viii. *Cyanotis axillaris*	8
2	**WEED MANAGEMENT**		**15**

	2 a. Methods of Weed Management	**2.1 Mechanical methods** - Ploughing, Hoeing, Hand weeding, Sickling and mowing, Burning and flooding, Mulching. **2.2 Biological methods -** Bioherbicides and their application in agriculture. **2.3 Chemical methods** -Study of weedicides with reference to properties, mode of action, formulation and uses of - i) 2, 4-D ii) Gramoxone (Paraquat)	08
	2b. Weed Biology	2.4 Weed physiology after application of herbicides 2.5 Absorption and translocation of herbicides with reference to photosynthesis 2.6 Concept of herbicide resistance	07
	TOTAL LECTURES		**30**

SEMESTER IV

PLANT PROTECTION PAPER – IV (DSC ID 46): INSECT PESTS, NON-INSECT PESTS AND THEIR MANAGEMENT

CREDITS: 2, LECTURE PERIOD: 3 PER WEEK

LECTURE HOURS :3 PER WEEK, MARKS: 50

UNIT	SUBUNIT	TOPIC	LECTURE PERIOD
1	**INTRODUCTION TO INSECT PESTS AND NON- INSECT PESTS**		**15**
	1 a. Introduction to Insect Pests and Non-Insect Pests	**1.1 Definition and losses (Qualitative and Quantitative) caused by insect pests** **1.2 General characters of insects.** **1.3 Introduction to common insect pests** a. Aphids b. Caterpillars c. Grasshoppers d. Thrips e. Weevils **1.4 Definition and losses (qualitative and quantitative) caused by non-insect pests** **1.5 Introduction to common non insect pests** a. Nematodes b. Snails and Slugs c. Rodents d. Birds	8
	1b. Study of Insect Pests	**1.6 Study of following insect pests of different crops with reference to – Scientific name, Marks of identification, Life cycle, Nature of damage and Management** a. Sugarcane white grub b. Jowar stem borer c. Paddy leaf hopper d. Guava White flies e. Brinjal fruit borer	7

		1.7 Study of following stored grain pests of different crops with reference to: Scientific name, Marks of identification, Life cycle, Nature of damage and Management a. Rice weevil b. Pulse beetle	
2	**MANAGEMENT OF INSECT PESTS AND NON- INSECT PESTS**		**15**
	2a. Management of Insect pests and non-insect pests	**2.1 Integrated Pest Management (IPM):** Introduction, history, importance, concepts, principles and tools of IPM. **2.2 Insecticides** a. Introduction b. Nature of formulation – Dusts, Granules, Wettable powder, Emulsifiable concentrates. c. Classification of insecticides based on i) Mode of entry – stomach, contact and systemic d. Insecticides - Common example with respect to introduction, chemical nature, properties, mode of entry, mode of action and uses of- Malathion, Carbaryl, Pyrethrin and Azadirachtin	8
	2 b. Recent trends in Pest Management	**2.3 Introduction, types and advantages of:** a. Attractants b. Repellants c. Antifeedants d. Pheromones e. Chemosterilants	7
	TOTAL LECTURES		**30**

Practical-I
(Based on paper I and II)

1. Study of green manures e.g., *Crotalaria juncea* and *Brassica juncea*.
2. Study of biofertilizers: *Rhizobium*, *Nostoc* and biopesticide: *Azadirachta indica.*

3 to 6. Agronomic study of following crops with reference to gross morphology, soil type, climatic conditions, planting materials and methods, irrigation, fertigation, yield and varieties

a. Cereal crop: Jowar

b. Pulses crop: Chick pea

c. Tuber crop: Potato

d. Oil crop: Groundnut

7 to 11. Agronomical study of following crops with reference to gross morphology, soil type, climatic conditions, planting materials and methods, irrigation, fertigation, yield and varieties

a. Fruit crop: Mango

b. Vegetable crop: Brinjal

c. Spice crop: Chili

d. Fibre crop: Cotton

e. Flower crop: Rose

12. Determination of sucrose percentage in Sugarcane by hand refractometer (any two varieties).
13. Isolation of soil fungi from soil sample by using serial dilution method.
14. Separation of amino acids from healthy and diseased plants using paper chromatography technique.
16. Study of seed borne pathogens by seed inoculation on PDA.
17. Preparation of Bordeaux mixture.

18 to 24. Study of following plant diseases with reference to host, symptoms, pathogen, disease cycle and their management

a) Mycoplasmal disease: Grassy shoot disease of sugarcane

b) Viral disease: Yellow Vein Mosaic of Bhendi

c)Bacterial disease: Guava fruit canker

d)Fungal disease: i. Rust of Soybean ii. White rust of *Amaranthus*,

iii. Grain smut of Jowar iv. Tikka disease of ground nut

25. Submission of crop diseases (any five).

Practical-II
(Based on paper III and IV)

1 to 8. Study of following weeds with reference to a) Gross morphology b) Reproduction c) Ecology, d) Dispersal and e) Management

A. Dicot Weeds

i. *Parthenium hysterophorus*

ii. *Ageratum conyzoides*

iii. *Alternanthera sessilis*

iv. *Boerhavia erecta*

B. Monocot Weeds

v. *Cyperus rotundus*

vi. *Cynodon dactylon*

vii. *Chloris barbata*

viii. *Cyanotis axillaris*

9. Study of weedicides with reference to properties, mode of action, formulation and uses of -
   i) 2, 4-D ii) Gramoxone (Paraquat)
10. Herbarium specimen preparation of weeds.
11. Study of following weeds with reference to estimation of seeds by seed count method- *Celosia argentea* or any locally available weeds.
12. Study of parasitic weeds e.g., *Orobanche, Striga, Cuscuta* and *Dendrophthoe*.
13. Study of common insect and non-insect pests with reference to morphology and nature of damage: Aphids, Caterpillars, Cutworms, Snails.
14. Study of nematode (slide preparation and observation).
15 to 19. Study of following insect pests of different crops with reference to –Scientific name, Marks of identification, Life cycle, Nature of damage and Management of
   a. Sugarcane white grub
   b. Jowar stem borer
   c. Paddy leaf hopper
   d. Guava white fly
   e. Brinjal fruit borer
20 and 21. Study of following stored grain pests of different crops with reference to –Scientific name, Marks of identification, Life cycle, Nature of damage and Management of
   a. Rice weevil
   b. Pulse beetle
22. Study of Insecticides with respect to, chemical nature, properties, mode of entry, mode of action and uses e.g., Malathion and Carbaryl
23. Study of Attractants (Light trap, sticky trap) and Repellants (Naphthalene ball, *Vitex negundo*).

24. Examples on preparation of pesticides for application.
25. Field visit/ excursion/visit to agricultural institute/ Agro industry/polyhouses.

PRACTICALSINPLANT PROTECTION

Study Tour/ Excursion:

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

Details of Practical Examination

B. Sc. II Plant Protection Practical – I and II are to be covered in 25 practicals each. These practicals are to be performed by the students. Each practical is to be supplemented by permanent slides, preserved / fresh specimens / materials, charts, photomicrograph, ideogram herbarium sheets, wherever necessary.

Every candidate must produce a certificate from Head of the Department in his / her college stating that he / she has completed practical course in a satisfactory manner as per the lines laid down by academic council on the recommendations of Board of Studies in Botany. The student should record his / her observations and report of each experiment should be written in the Journal.

The Journal is to be signed periodically by teacher in charge and certified by Head of the Department at the end of the year. Candidates have to produce their certified journal and tour reports at the time of practical examination. **A candidate will not be allowed to appear for the practical examination without a certified journal, otherwise a candidate mustproduceaseparatecertificateofhis/herregularattendanceforpracticalcourseandcompletionofthe same signed by the concerned teacher and Head of the Department.**

TotalMarksforpractical100Marks

a) Practical–I:50Marks

b) Practical– II:50Marks

The practical course is to be covered in 50 practicals. The practical course should be divided into Practical - I which will comprise 25 practicals based on Paper V and Paper VI whereas the Practical - II will comprise 25 practicals based on Paper VII and VIII. The Practical - I will carry 50 marks and practical II will also carry 50 marks. The practical examination will be conducted at the end of semester IV on two successive days.

Each practical examination (Practical I and II) should be of 5 hours duration and shall test a candidate in respect of following–

i. Identification and preparation of temporary and permanent slides.
ii. Practical study of different diseases as per the syllabus.
iii. Understanding of principles of the experiments.
iv. Identification and setting of experiments.
v. Recording of observations and conclusions.
vi. Identification and understanding of the practicals conducted with respect to Plant Protection.
vii. Spotting of the specimens as per the syllabus.
viii. Submission of the tour report.

Course Out comes:

Paper I:
After successful completion of the course, the students will be able -

1. To know the scope and importance of the Plant protection.
2. To summarize concept of organic farming.
3. To understand general methods of Plant Protection.
4. To comprehend advances in agricultural practices.
5. To differentiate major agronomical crops with respect to cereals, legumes, root crops, tuber crops, sugar crops, oil crops, fruit crop, vegetable crop, spices and flower crop.

Paper II:
After successful completion of the course, the students will be able -

1. To understand concepts of plant pathology.
2. To know physiology of mechanism behind infection.
3. To study plant diseases.
4. To know the principles of plant diseases control through resistance.
5. To understand management of plant diseases.

Paper III:
After successful completion of the course, the students will be able -

1. To summarize concept of weed.
2. To study and identify weeds.
3. To know negative importance of weeds.
4. To understand weed biology.
5. To know methods of weed management.

Paper IV:
After successful completion of the course, the students will be able

1. To know the concept of Entomology.
2. To identify agricultural pest.
3. To understand negative impact by insect and non-insect pests.
4. To summarize different methods of management of insect pest.
5. To know formulation of insecticides.

(iii) Specific Objectives: ----------

(iv) A brief note: - (On expected level of study from examination and assessment point of view):------

(v) Recommended Reading:

(In MLA/APA Style Sheet Format)

a) Basic Reading: -

b) Additional Reading: -

c) References: -

d) Books

List of Books Recommended for B. Sc. II Plant Protection

- A Text book of Modern Plant Pathology Bilgrami K.S. Vikas, Mumbai.
- A. Textbook of Modern Plant Pathology, Bilgrami K. S., Blackwel Science, USA.
- Agronomy V. J. -Vaidya *et. al.* Continental publication
- Commercial Vegetable Growing –Tindall, Oxford University Press 1972.
- Essentials of Agronomical Entomology. Dhaliwal, Singh, Chhilar. Kalyani Publication.
- Principles and Procedures of Plant Protection – Chattopadhyay.
- Crop production and field experimentation- Vaidya Sahastrabudhe and Khupse.
- Cropping System Theory and practice- V. N. Chattarjee oxford and BPH publishing Co. Pvt. Ltd.
- Handbook of Agriculture- IARI, New Delhi.
- Plant Pathology (S Chand Publication) B. P. Pande.
- Plant pathology by Mukundam.
- Agronomy V. J. -Vaidya *et. al.* Continental publication.
- Commercial Vegetable Growing –Tindall, Oxford University Press 1972.
- Principles and Procedures of Plant Protection – Chattopadhyay.
- Crop production and field experimentation- Vaidya Sahastrabudhe and Khupse.
- Agricultural pests of south east Asia by Atwal and Dhaliwal.
- Cropping System Theory and practice- V.N. Chattarjee oxford and BPH publishing Co. Pvt. Ltd.
- Handbook of Agriculture- IARI, New Delhi.
- Handbook of Entomology. T.V. Prasad. New Vishal Publication.
- Identification of Crop Varieties – Agarwal. Scientific Crop Production, Mathur.
- Plant Pathology (S Chand Publication) B.P. Pande.
- Plant Pathology by Mukundam.
- Principles of applied Entomology. Raghumurthy, Shrinivasan, Balasubramanhyam, Natarajan. A. E. Publication.
- Cropping System Theory and practice- V.N. Chatterjee Oxford and BPH Publishing Co. Pvt. Ltd

- Experiments in Microbiology Plant Pathology and Tissue Culture Aneja K.R. Wishwa Prakashan, Daryaganj.
- Fundamentals of Plant Pathology Mehrotra. R. S, Aggarwal. A; McGraw Hill Education Private Limited, New Delhi.
- Laboratory Manual of Plant Pathology Jain Vinod Kumar Oxford Book, Calcutta
- Modern Entomology. D.B. Tembhare. Himalaya Publishing House.
- Plant Pathology Agrios George N. Academic Press, New York.
- Plant Pathology Butler Edwin Periodical Expert, Delhi.
- Principles and Procedures of Plant Protection Chattopadhyay, S.B. Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi
- Text Book of Plant Pathology Baruah H. K. Oxford Book, Calcutta.
- Weed of The World King, L. J. Wiley Eastern, Mumbai.
- Principles of weed science Rao V. S. Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi.
- All About Weed Control Subramanaian, S. Ali, A. M. Kalyanipub, New Delhi.
- Weed Science Thakur, C Metropolitan, New Delhi.
- A Compendium of Indian Weed Science Research Khuspe, V. S, Subbaiah, R. Metropolitan, New Delhi.
- Weed control handbook principles ROBERT H. A. Blackwell Pub., New Delhi.
- Weed Management Principles and Practices Gupta, O. P. Agrobios, J.
- Modern weed management GUPTA O. P. Agrobios,J.
- Scientific Weed Management, Gupta, O. P., Today and Tomorrows, New Delhi.
- Manual of weed control Joshi, N.C. Research Publication, Delhi.

C] OTHERFEATURES:

1. INTAKECAPACITY / NUMBEROFSTUDENTS: -

Asper university rules.

2. TEACHERSQUALIFICATIONS: -

• As prescribed by norms.

• However, required number of core faculty should be given for particular course along with paper wise and Specialization wise work load allocation.

• Work load details should be as per Apex body/UGC/State Govt./University norms.

3. The Board of studies should clearly mention the required Books, Journals and specific Equipments necessary for the Course.

(A) LIBRARY: Library be equipped with the required Reference and Text Books, Journals and Periodicals for higher and advanced studies as per stated in revised syllabus and approved by BOS.

(B) SPECIFIC EQUIPMENTS:

L.C.D., Overhead Projector, Computers and necessary software and operating systems

etc. are necessary to run the course

(C) LABORATORYSAFETYEQUIPMENTS:

1. Fire extinguishers at least two sets in each laboratory of 600 sq. ft. Area.
2. Leakage of gases be avoided.
3. First aid kit be made available.
4. Sugar / Glucose –500gm pack- a pinch of sugar and a cup of drinking water in hypoglycemic condition or in extreme weakness of student or a person concerned.

D) GENERAL SAFETY RULES FOR LABORATORYW ORK

1) List of equipments needed for Laboratory Safety: -

1. Fire extinguisher
2. First Aid Kit
3. Good earthing and insulated wirings for electrical supply.
4. Emergency exit
5. Apron and goggles wherever necessary
6. Fuming Chambers
7. Masks flows and shoes while handling hazardous chemicals & gases (Good valves, manometers and regulators for gas supply)
8. Operational manuals for instruments (handling to be made as suggested.)
9. Rules of animals and blanks ethics.
10. Leakage of gases to be avoided.
11. Cylinders or flow pipes to handle Acids.
12. No weighing for NaOH and hygroscopic substances.
13. Stabilized supply in the laboratory.

2) There is No Substitute for Safety:

1. Any injury no matter how small, it must be reported to teacher immediately.
2. a) In case any chemical enters your eyes go immediately to eye- wash facility and flush your eyes and face with large amount of water.
   b) For acid or phenol split, do not use water instead put some bicarbonate.
3. In case of fire, immediately switch of all gas connections in the laboratory and pours and on the source of fire or cover it with asbestos or cement sheet.
4. While leaving laboratory, make sure that gas, water taps and electricity are switched off.
5. Remove your lab coat. Glove sand clean your hands before leaving laboratory.
6. Make your work place clean before leaving the laboratory.
7. Keep your hands away from your face, while working in laboratory.
8. Each laboratory must have a first aid box.
9. Know what to do in case of emergency-e.g.

a) Know the place of fire extinguisher and first aid box.

10. Don't use cell phones in the laboratory.

a) Remember important phone numbers

3) DO'S

1. Always wear lab coat, shoes in the laboratory. Every student must have their weight box, a napkin etc.
2. Maintain separate record book for each subject.
3. Keep your belongings at the place allotted for the same.
4. Maintain silence, order, cleanliness and discipline in the laboratory.
5. Work at the place allotted to you or specially used for certain operations.
6. Keep the working table clean.
7. Handle the laboratory equipments, glassware and chemical with great care.
8. Use only required quantities of material and apparatus of essential size.
9. Perform the test in their proper order.
10. Know the location of eye wash fountain and water shower.
11. Minimize your exposure to organic solvents.
12. The Metal like sodium should be kept under kerosene or liquid paraffin layer in a vessel with a cork stopper.
13. Sodium metal should be cut on dry filter paper. The cutoff pieces of sodium should be immediately collected in a vessel containing kerosene or liquid paraffin.
14. Always pour acid into water when diluting and stir slightly.
15. All operations involving poisonous flammable gases and vapours should be carried out in the flame chamber (with exhaust facility)
16. Ladies should avoid wearing saree. If it is there, apron is essential.

4) DON'TS

1. Don't work alone in the laboratory
2. Don't leave the glasswares unwashed.
3. Don't take apparatus, chemicals out of lab.
4. Don't leave any substance in a vessel or bottle without label.
5. Don't weigh the reagent directly on the balance pan.
6. Don't throw the cut off pieces of sodium metal in sink or water. Transfer it immediately in its container.
7. Don' t take sodium metal with hands. Use forceps.
8. Don't panic and run in case of fire. Use the fire extinguishers or sand buckets.
9. Don't breathe the vapors of organic solvents.
10. Don't pour any unused reagent back in its stock bottle.
11. Don't eat or drink any food in laboratory.
12. Don't use inflammable solvents like benzene, ether, chloroform, acetone and alcohol around flame.
13. Don't distill to dryness.

14. Don’t exchange stoppers of flask sand bottles containing different reagents.

15. Don’t leave reagent bottle lying on the table.

16. Don’t disturb the order of reagent bottles in which they are placed.

17. Don’t bring reagent on your working table from the general shelf.

18. Don’t throw burning match stick in to dustbin.

19. Don’t leave the laboratory without permission.

5) LABORATORY/FIELD WORK CARE AND SAFTY FOR PLANT PROTECTION STUDENTS

1. Unnecessary wastage of plant material during practicals should be avoided.

2. During study tour / personal collection, more emphasis be given on study of plants in nature and collection of wild plants should not be carried out.

3. If at all the collection of the plant material in needed, it should be carried out under supervision of concerned teacher. Collection of poisonous plants/ poisonous mushrooms should be avoided.

4. Oral intake of unknown plant material, out of curiosity, during practical or collection tour is strictly prohibited.

5. If there is any allergic reaction while handling the plants / plant parts / pollen grains / fungal specimens it should be immediately brought to the notice of the concerned teacher and reported to the registered medical purloiner.

6. Wearing of hand gloves (and mask) is essential while handling poisonousplants/herbariumsheets/toxicandhazardouschemicals/reagents/strongacids
/ Strong alkalis during the experiment should be made with vacuum pipette / auto pipette/ burette under the supervision of concerned teacher /lab assistant.

7. Highly inflammable organic solvents (alcohol, acetone etc.) should not be kept in vicinity of spirit lamp.

8. The laboratory safety measures adopted for handling of hazardous chemicals inchemistrypracticalsshouldbefollowedforconductingpracticalsinplantbiochemistry/microbiology.

9. Operational manuals for equipments such or centrifuge, autoclave, spectrophotometer should be followed.

10. In case of minor injuries, preliminary treatment should be undertaken with the help of first aid kit available in the laboratory. In case of serious injury, concerned teacher should be immediately contacted for consultation to the physician.

11. The instruction report for breeding, experimentation will be submitted in a week period.

(Which are laid down by Ministry of Social Justice & Empowerment and Ministry of Environment and Forests, Govt. of India).

PROGRAM SPECIFIC OUTCOMES (PSO) OF PLANT PROTECTION:

In life science plant sciences is one of the most important basic and applied subjects. Plants synthesize their own food material using water and carbon dioxide in presence of

sunlight and releasing oxygen as a byproduct. Plants are basis of biodiversity and they fulfill basic needs of all living organism *viz*. food, oxygen, etc. We can't imagine life on earth without plants. This course has been designed to give the fruitful knowledge and commercial skills in the various aspects of plant science. After successful completion of this program students will be able

PSO1: To understand the various aspect of plant protection and major agronomical crops.

PSO2: To understand the basics of plant pathology.

PSO3: To understand the weed science.

PSO 4: To understand the insect and non-insect pest and their management.

List of skill enhancement courses:

1. Agricultural skills.
2. Vermicompost and organic farming techniques.
3. Weed identification and herbarium technique.
4. Plant resources.
5. Identification and management of plant diseases.
6. Principles of plant diseases control.
7. Forecasting of plant diseases.
8. Recent trends in pest management.

LinkforinformationaboutSECcoursesfromNationalSkillsQualificationFramework(NSQF):https://nqr.gov.in/national-skills-qualification-framework

(You may add or delete any courses as per available facilities)