SHIVAJI UNIVERSITY, KOLHAPUR.

Accredited By NAAC with 'A' Grade

Revised Syllabus For

Bachelor of Science

Part-II

Plant Protection

CBCS PATTERN

Syllabus to be implemented from

June, 2019 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**
2. **Optional under the Faculty of Science**

3. **YEAR OF IMPLEMENTATION**:- Revised Syllabi will be implemented from June 2019 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 and expected level of study with required outcome in terms of basic and advance knowledge at 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) 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.
10)

5. DURATION

The course shall be a full time course.

6. PATTERN:-

Pattern of Examination will be Semester.

7. FEE STRUCTURE :-

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:

a. 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 COURSE- B. Sc. II Plant Protection (Optional)

SECOND YEAR (SEMESTER III/IV) (NO. OF PAPERS IV)

Sr. No.	Subjects/Papers	Theory	Total Marks
1.	Paper-I	50	50
2.	Paper-II	50	50
3.	Paper-III	50	50
4.	Paper-IV	50	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

A) NATURE OF THEORY PAPERS:-

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

PAPER NO.	TITLE OF THE PAPERS
Semester III	
Paper – I	Major crops, methods of integrated Plant Protection
Paper –II	Insect pests and their management
Semester IV	
Paper - III	Introduction to weeds and weed management.
Paper - IV	Crop diseases, their management and pathophysiological skills

12. <u>SCHEME OF EXAMINATION</u> :-

- The examination shall be conducted at the end of each term for semester pattern.
- The Theory paper shall carry 50 marks.
- The evaluation of the performance of the students in theory papers shall be on the basis of Semester Examination of 50marks.
- 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 & regulation for each degree.

14. NATURE OF QUESTION PAPER AND SCHEME OF MARKING: Common Nature of Question paper as per Faculty of Science.

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

(Introduced from June 2019 onwards)

Old Syllabus (Semester pattern)		**Revised Syllabus (Semester pattern)**	
PAPER NO.	**TITLE OF THE PAPER**	**PAPER NO.**	**TITLE OF THE PAPER**
Semester III		**Semester III**	
Paper – I	Major crops, methods of integrated Plant Protection	**Paper – I**	**Major crops, methods of integrated Plant Protection**
Paper –II	Crop diseases and their management	**Paper –II**	**Insect pests and their management**
Semester IV		**Semester IV**	
Paper - III	Introduction to weeds and Non-insect pests	**Paper - III**	**Introduction to weeds and their Management**
Paper - IV	Insect pests and their management	**Paper - IV**	**Crop diseases, their management and pathophysiological skills**

Shivaji University, Kolhapur

B. Sc. II-Plant Protection

Semester Revised Syllabus (To be implemented from June, 2019)

For each semester there will be two papers each of 50

marks. The pattern of papers will be as follow:

SEMESTER III

PAPER I (DSC IC 45):

MAJOR CROPS AND METHODS OF INTEGRATED PLANT PROTECTION

PAPER II (DSCIC46):

INSECT PESTS AND THEIR MANAGEMENT

PAPER – I (DSC IC 45)

MAJOR CROPS AND METHODS OF INTEGRATED PLANT PROTECTION.

CREDITS: 2, LECTURE PERIOD: 3 PER WEEK- LECTURE HOURS: 2.4 PER WEEK, MARKS: 50

Unit No. 1	**Introduction of plant protection and study of crops**	12
Sub unit1.2	Introduction and importance of plant protection.	
	Study of following crops of Maharashtra with reference to gross morphology for crop identification, soil, field preparation, Hybrid varieties, sowing, seed rate, spacing, inter culture operations, fertilizers, irrigation, intercropping, yield, economic importance, major list of diseases and pest.	
	A) Cereal – Jowar	
	B) Oil seed crop - Groundnut	
	C) Pulse crop - Gram	
	D) Cash crop - Sugarcane	
Unit No. 2	**Study of crops with reference to above points in 1.2**	10
Sub unit2.1		
	E) Fruit crop - Mango	
	F) Vegetable crop – Brinjal	
	G) Spice - Chilli	
	H) Floriculture - Marigold	

Sub unit 2.2	**Advances In Agricultural practices**	
	A) Green manuring	
	B) Bio fertilizers and its types	
	C) Bio fungicides	
	D) Bio pesticides	

Unit No. 3	**General methods of plant protection.**	10
Sub unit 3.1	Cultural methods – Tillage, crop rotation, trap crops, fertilizer applications	
Sub unit 3.2	Mechanical methods – Field sanitation, Hand picking, destruction of egg masses, light traps, use of sticky bands, bagging for the pests.	
Sub unit 3.3	Physical methods – Heat and soil solarisation	
Unit No. 4	**Methods of Management**	**(13)**
Sub unit 4.1	**Chemical methods** –Brief account and uses of Bactericides Fungicides, Insecticides, Nematicides, Acaricides, Molluscicide and Rhodenticides	
Sub unit 4.2	**Biological methods** – Biological control of Insect pests and crop diseases.	
Sub unit 4.3	**Legal methods** – Plant quarantine in India.	
Sub unit 4.4	Crop resistance – Uses of resistant varieties and their examples	
	Total lectures	**45**

PAPER – II (DSC IC 46): INSECT PESTS AND THEIR MANAGEMENT

CREDITS: 2, LECTURE PERIOD: 3 PER WEEK- LECTURE HOURS: 2.4 PER WEEK, MARKS: 50

Unit No. 1	**Introduction to insect pests**	09
Sub unit 1.1	Definition and losses (qualitative and quantitative) caused by insect pests	
Sub unit 1.2	General characters of typical insect	
Sub unit 1.3	Classification of insect pests based on	
	a) Nature of damage	
	b) Mouth parts	
	c) Metamorphosis	
Unit No. 2	**Study of insect pests**	**16**
Sub Unit 2.1.	**Study of following insect pests of different crops with reference to –** a) Scientific name b) Marks of identification c) Life cycle d) Nature of damage e) management	
	i) Jowar – Stem borer	
	ii) Sugarcane – White grub	
	iii) Gram – Pod borer	
	IV) Mango – Jassids	
	V) Brinjal – Fruit borer	
	VI) Rose - Thrips	
Sub unit 2.2	**Stored grain pests and their management.**	
	I) Rice weevil ii) Pulse beetle	

Unit No. 3	**Management of Insect pests.**	14
Sub unit 3.1	Principles of insect pest control.	
Sub unit 3.2	Classification of insecticides based on:	
	a) Mode of entry – stomach, contact, systemic	
	b) Mode of action – Respiratory, Nervous	
	c) Chemical nature – i) Inorganic ii) Organic – Chlorinated hydrocarbons, Organophosphates, Carbamates, Synthetic pyrethroids iv) Plant origin insecticides	
	d) Nature of formulation – Dusts, Granules, Wettable powder, Emulsifiable concentrates.	
Unit No. 4	**Recent trends in pest management**	6
Sub unit 4.1	a) Attractants b) Repellents c) Antifeedents d) Pheromones e) Chemosterilants f) Precautionary measures used during pesticide application.	
	Total	45

SEMESTER IV

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

PAPER IV (DSC ID 46): CROP DISEASES, THEIR MANAGEMENT AND PATHOPHYSIOLOGICAL SKILLS.

PAPER – III

INTRODUCTION TO WEEDS AND WEED MANAGEMENT

CREDITS: 2, LECTURE PERIOD: 3 PER WEEK- LECTURE HOURS: 2.4 PER WEEK, MARKS: 50

Unit No. 1	**Introduction of weeds**	08
Sub unit 1.1	Weeds – Definition and losses caused by weeds.	
Sub unit 1.2	Classification of weeds based on	
	Ontogeny, b) Ecology, c) Crop association	
Sub unit 1.3	Reproduction and mode of dispersal of weeds.	
Sub unit 1.4	Study of parasitic and poisonous weeds.	
Unit No. 2	**Study of following weeds with reference to a) Gross morphology for weed identification b) Reproduction c) Ecology, d) Dispersal e) Management**	14
Sub unit 2.1	*Parthenium hysterophorus*	
Sub unit 2.2	*Argemone mexicana*	
Sub unit 2.3	*Celosia argentea*	
Sub unit 2.4	*Euphorbia hirta*	

Sub unit 2.5	*Amaranthus spinosus*	
Sub unit 2.6	*Alternanthera sessilis*	
Sub unit 2.7	*Cyperus rotundus*	
Sub unit 2.8	*Cynodon dactylon*	
Unit No. 3	**Methods of weed management**	14
Sub unit 3.1	Mechanical methods - Ploughing, Hoeing, Hand weeding, Sickling and mowing, Burning and flooding, Mulching.	
Sub unit 3.2	Biological methods - Weed management by bacteria, fungi and insects	
Sub unit 3.3	Chemical methods - Classification of weedicides on the basis of chemical nature, mode of action.	
Sub unit 3.4	Study of weedicides with reference to properties, mode of action, formulation and uses of i) Glyphoset ii) Gramoxane (Paraquat).	
Unit No. 4	**Study of Laboratory techniques**	09
Sub unit 4.1	Hand refractometer	
Sub unit 4.2	Culture techniques: Culture media and its types, Dry and Wet Methods of sterilization.	
Sub unit 4.3	Pesticide application technique: Spraying.	
	Total	45

PAPER – IV

CROP DISEASES,THEIR MANAGEMENT AND PATHOPHYSIOLOGICAL SKILLS

CREDITS: 2, LECTURE PERIOD: 3 PER WEEK- LECTURE HOURS: 2.4 PER WEEK, MARKS: 50

Unit No. 1	**Crop diseases**	**14**
Subunit 1.1	Definition and concept of disease, Terminologies in Plant Pathology: Host, pathogen, pathogenecity, pathogenesis, symptoms, infection, incubation period, Etiology, susceptibility, immunity, hypersensitivity, resistance.	
Subunit 1.2	Classification of plant diseases – Based on a) Pathogens. b) Symptoms. c) Severity of disease –sporadic, epidemic and epiphytotic. d) transmission of pathogens through seed, soil, air and insects.	
Subunit 1.3	Methods of studying plant pathogens a) Isolation b) Methods of Inoculation c) Incubation	
Unit No. 2	**Mechanism of plant infection**	**08**
Subunit 2.1	Mechanism of infection	
Subunit 2.2	Mode of infection	
Subunit 2.3	Factors affecting infection	
Unit No. 3	**Study of following crop diseases with reference to symptoms, pathogen, disease cycle and their management.**	**13**
Subunit 3.1	Diseases caused by phytoplasma- Little leaf of Brinjal	
Subunit 3.2	Diseases caused by Viruses - Yellow vein mosaic of Okra (Bhendi)	
Subunit 3.3	Diseases caused by Bacteria -Citrus canker	
Subunit 3.4	**Diseases caused by Fungi** i) Rust of Sugarcane ii) Rust of soybean III) Rust of Wheat IV) White Rust of Crucifers v) Grain smut of Jowar	

	vi) Tikka disease of Groundnut VII) Blight of Marigold	
Unit No. 4	**Management of crop diseases and pathophysiological skills**	**10**
Subunit 4.1	**Mechanical method:** Eradication	
Subunit 4.2	**Chemical method**: Classification of fungicides based on chemical nature and mode of action.	
Subunit 4.3	Study of properties, formulation, mode of action and uses of Carbendazim and Benomyl.	
Subunit 4.4	**Pathophysiological skills:** a) Paper chromatographic technique: Introduction, principle and applications. b) Micrometry: Introduction, principle and applications.	
	Total	45

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PRACTICAL – I (Based on Paper I & Paper III)

Sr. N0	Name of Practical
1to 5	Agronomic studies of following crops with reference to gross morphology for crop identification and agronomic conditions Jowar, Groundnut, Gram, Sugarcane, Cotton, Elephant grass, Mango, Brinjal, Chili, Marigold.
6	**Agricultural practices** Green manuring: Sunhemp and Delchi. Biofertilizers: *Rhizobium* and *Nostoc*. Biopesticides: *Trichoderma* and Pyrethrin.
7 to 10	Study of following weeds with reference to gross morphology for identification, reproduction, dispersal and management.
	A) Dicot weeds a) *Argemone mexicana* b) *Parthenium hysterophorus* c) *Amaranthus spinosus* d) *Alternanthera sessilis* e) *Euphorbia* sps. f) *Celosia argentea*
	B) **Monocot weeds** a) *Cyperus rotundus* b) *Cynodon dactylon*
11	Study of following weeds with reference to estimation of seeds by seed count method- a) *Argemone Mexicana* b) *Celosia argentia* or any locally available weed as per syllabus.
12	**Study of mode of dispersal in following weeds.** a) *Parthenium hysterophorus* *b) Tridax proucmbens* *c) Xanthium strumarium* *d) Alternanthera* sps. *e) Achyranthus aspera* *f) Cynodon dactylon*

13	Study of weedicides with reference to properties, mode of action formulation and uses of Glyphoset and Gramoxane
14	Herbarium technique in weed.
15 to 16	Determination of pH by pH meter and electrical conductivity of two soil samples from Crop fields.
17	Determination of soil moisture from crop fields (Two samples).
18 to 20	Sterilization and Preparation of PDA culture medium.
21 to 24	Soil dilution technique- Serial Dilution, Isolation, Inoculation and identification of soil fungi.
25	Tour report.

Total practicals 25

Distribution of Marks

PRACTICAL – I	Marks
1) Major crops	**07**
2) Agricultural practices	**06**
3) Study of weeds	**10**
4) Laboratory techniques	**17**
5) Journal	**05**
6) Field visit	**05**
Total	**50**

PRACTICAL – II (Based on Paper II & Paper IV)

1 to 8	Study of following diseases in crops with reference to host, causal organism, symptoms and management.
	A) Phytoplasmal Disease-**Little leaf of Brinjal** Compare healthy and infected specimens by observing external symptoms and leaf area by graph method.
	B) Viral Disease- **Yellow vein Mosaic of Okra (Bhendi)**
	C) Bacterial Disease - **Citrus canker**
	D) **Fungal Diseases:** a) Rust of Sugarcane b) White rust of *Amaranthus* / Crucifers c) Rust of Wheat d) Rust of Soybean e) Grain smut of Jowar f) Tikka disease of Groundnut g) Blight of Marigold
9	Study of attractants and repellents (Any one from each group)
10 to11	Study of any two Insecticides, bactericides and fungicides with reference to chemical nature, properties, mode of action and uses.

12	Technique of collection and preservation of insect pests. a. Wet preservation b. Dry preservation
13 to 17	Study of following insect pests with reference to scientific name, life cycle, marks of identification, nature of damage and management. a. Jowar – Stem borer b. Sugarcane – White grub c. Gram – Pod borer d. Mango – Jassids e. Brinjal – Fruit borer f. Rose – Thrips
18 to 19	**Study of following stored grain pests as per above points**.
	a.Rice weevil b.Pulse bettle
20 to 21	Separation of amino acids from healthy and diseased plants using paper chromatography technique.
22	Determination of sucrose percentage by Hand refractometer in Sugarcane and Grape.
23	Measurement of fungal spores diameter by Micrometry technique.
24	Study of pesticide application equipment: Sprayer and Fogger
25	Preparation of pesticides for application (Examples).
26	Tour report / Excursions / Visits to Agricultural institutes / Polyhouses
	Total Practicals 26

Distribution of Marks

PRACTICAL – II	**Marks**
1) Study of crop diseases	**12**
2) Study of insect pests	**8**
3) Chromatography	**6**
4) Micrometry	**4**
5) Preparation of pesticide solution	**4**
6) Insecticides, fungicides and bactericides	**6**
6) Tour report	**5**
7) Journal	**5**
Total	**50**

PRACTICAL EXAMINATION INSTRUCTIONS:

A. Each candidate must produce a certificate from Head of the Department stating that he/she has completed practical course in satisfactory manner recommended by Board Studies and Laboratory Journal has been properly maintained. Every candidate must have recorded his/her observations in the laboratory journal and written report on each exercise performed. Every journal is to be checked and signed periodically by a Teacher Incharge and certified by the Head of the Department at the end of the year. Candidates are to produce their journals at the time of practical examination. Without which he/she shall not be allowed to appear for practical examination.

B. Excursions for the study of crops, plants, weeds in local areas should be frequent and report thereon should be submitted. One of excursions shall be to research institute or Agricultural centre's actively engaged in Plant Protection for not more than 5 days. There shall be one teacher-in-charge for not more than 16 students and one additional lady teacher, one field collecter and one peon are to be allowed for study Tour. T.A. and D.A. be paid to the concerning staff as per University Rules. Each candidate must submit tour report of the same.

C. Each candidate must complete the project work as per the guidelines provided and it should be certified from the In charge teacher and head of the Department.

D. Candidate shall be required to submit the following records at the time of practical examination.

1. Certified laboratory Journal

2. Tour Report - visit to fields, Agricultural Institutes, Playhouses

3. Project Work

4. Submission of preserved or dry specimens of diseased plants (at least ten), preserved insect pests (at least ten), herbaria of weeds (at least ten).

E. Candidate will be orally examined in their project work and submission.

GUIDELINES FOR PROJECT REPORT SUBMISSION:

1. It should be of 10 to 15 pages, well certified by the teachers Incharge & H.O.D.

2. It should contain index, introduction, matter, conclusion and list of reference.

3. It should be based upon any article related to advanced agriculture.

4. Following topics may be included for the **project work.**

i. **Group of pesticides -** Commercial name, manufacturer, Chemical nature, dosages, season of application, diseases controlled.

ii. **Growth hormones** - Commercial name, manufacturer, Chemical nature, dosages, various applications.

iii. Cultural practices, economics, and marketing of any crop.

iv. Govt. schemes for the welfare of farmers.

v. Losses due to mineral deficiencies in the crops.

vi. Breeding Programme of any crop.

vii. Herbicides - Commercial name, Chemical content, manufacturer, weed management.

viii. Toxic hazards due to pesticides and precautions during their applications.

ix. Identification of crop varieties.

x. Common diseases / pests of particular crop.