" Education for Knowledge, Science and Culture."

– Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanand Shikshan Sanstha's

VIVEKANAND COLLEGE, KOLHAPUR. (AUTONOMOUS)

B.Sc. Part - II CBCS Syllabus

PLANT PROTECTION

Semester-III & IV

Theory : 60 Hours (75 Lectures) Credits - 4

Semester	Paper No.	Course Code	Course Title	No. of Credits
III	I	DSC -1012C2	"General Agriculture and Plant Pathology"	04
IV	II	DSC-1011D2	"Weed Science and Insect Pest"	04

CBCS Syllabus to be implemented from 2022 - 2023

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VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS).

Department of Botany

Sub: Plant Protection (DSC 1012 C2 & DSC 1011 D2)

B.Sc. – II (2022-2023)

Programme Outcomes

1. The aims of this programme is to enable the student to reach current understanding of plant protection and practical skills in field of employment.
2. Detailed knowledge on the subject to improve the farmer's condition by their contributions.
3. Practical knowledge of cultivation practices will transform them into agricultural entrepreneurship.

VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS).

Department of Botany

Sub: Plant Protection (DSC 1012 C2 & DSC 1011 D2)

Course Outcome's :

B.Sc. Part-II, Semester-III:

Paper-I: DSC 1012 C2 : "General Agriculture and Plant Pathology"

Section – I : "General Agriculture"

1) To study and acquaint with basic knowledge of agriculture and its allied branches.
2) Students will know principles of agriculture practices, modern systems of farming of agricultural crops and best cropping management suitable in local climate.

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Section – II: "Plant Pathology"

1) Students will know symptoms, etiology, disease cycle and management of major diseases of field crops.
2) To acquaint with different strategies for management of plant diseases.

B.Sc. Part-II, Semester-IV:

Paper-II : DSC 1011 D2 : "Weed Science and Insect Pest"

Section – I : "Weed Science"

1) To acquaint the knowledge of weed habitat and its management.
2) To reveal safe, economic and effective weed management practices.

Section- II: "Insect Pest"

1) To familiarize the students about nomenclature, nature of damage and seasonal incidence of insect pests that cause loss to major field crops.
2) Students will get familiarize integrated pest management practices.

B.Sc. II – Plant Protection

Semester – III

Theory: 60 Hours (75 Lectures) Credits : 4

Paper I	**DSC – 1011 C2 : "General Agriculture and Plant Pathology"** **Section : I "General Agriculture"**	**No. of Hours per Unit / Credit**
Unit : I.	**Introduction of agriculture and study of major crops** 1a: Introduction and importance of agriculture. 1b: Study of following crops of Maharashtra with reference to botanical name, common name, geographical distribution, origin, gross morphology, soil and climate, seed and sowing, varieties, manures and fertilizers, water management, inter culture operations, major diseases and pests, signs of maturity, harvesting and yield and economic Importance. A. Cereal – **Rice** B. Oil seed crop – **Soybean** C. Pulse crop – Gram D. Cash crop - Sugarcane	07 hrs
Unit . II.	Study of crops with reference to botanical name, common name, geographical distribution, origin, gross morphology, soil and climate, seed and sowing,varieties, manures and fertilizers, water management, inter culture operations, major diseasesand pests, signs of maturity, harvesting and yield and economic Importance. 2a: E. Fruit crop – Mango F: Vegetable crop – Brinjal G: Spice –Turmeric H: Floriculture – Rose 2 b: Organic farming and Advanced Agricultural practices a) Organic Farming – Introduction, Importance, Limitations. b) Transgenic methods (*Agrobacterium* mediated gene transfer) , Examples of Transgenic crops.	07hrs
Unit. III.	**Methods of Plant Protection part - I.** 3a: Cultural methods – Tillage, crop rotation, trap crops, fertilizer applications, **land fallowing, timely sowing and proper soil selection.** 3b: Mechanical methods – Field sanitation, Hand picking, Destruction of infected plants / plant parts, Destruction of egg masses, light traps, use of sticky bands, bagging for	06hrs

	the pests and **Pheromone traps.** 3c: Physical methods – Heat and soil solarisation	
Unit. IV	**Methods of Plant Protection part – II.** 4 a: Chemical methods –Definition, uses with two suitable examples of each Bactericides, Fungicides, Insecticides, Nematicides, Acaricides , Molluscicides and Rodenticides 4b: Biological methods – Definition, Important biocontrol agents. a) Fungi : (*Trichoderma, Metarhizium, Verticillium*) b) Bacteria : *Pseudomonas, Bacillus* c) Insect : *Crysopyrilla / **Trichogramma*** **d) Virus** 4c: Legal methods – Plant quarantine in India. 4d: Crop resistance – Uses of resistant varieties and their examples	10hrs

Total hours : 30

B.Sc. II – Plant Protection

Semester – III

Theory: 60 Hours (75 Lectures) Credits : 4

Paper I	**DSC – 1011 C2 : "General Agriculture and Plant Pathology"** **Section : II "Plant Pathology"**	**No. of Hours per Unit / Credit**
Unit : I.	**Crop diseases** 1a: Introduction and importance of Plant Pathology. 1b: Definition and concept of disease, Terminologies used in Plant Pathology: Host,Pathogen,Inoculum,Virulence,Pathogenecity,Pathogenesis, Prediposition, Symptoms, Infection,Incubation period, Etiology, Disease cycle, Resistance, Susceptibility, Immunity, Hypersensitivity, Cross protection,Phytoalexins, Siderophores ,**Inoculum potential, Dissemination Virus, Mycoplasma, Viroid.** 1c: Classification of plant diseases – Based on a) Pathogens, b) Symptoms, c) Severity, spread and occurrence of disease d) transmission of pathogens through e) Host f) Cause (Biotic, Abiotic and Mesobiotic) g**) epidemiology** 1d. Symptoms and signs of plant diseases (Chlorosis, Necrosis, Mildew, Rust and Smuts) 1e: Methods of studying plant pathogens and Koch's Postulates **a)** Isolation of Fungi and Bacteria **b)** Methods of purification of Fungi and Bacteria **c)** Koch's Postulates	07 hrs
Unit . II.	**Mechanism of plant infection** 2a: Mechanism of infection (Fungi, Bacteria and Virus) 2b: Factors affecting infection	05hrs
Unit. III.	**Study of following crop diseases with reference to pathogen, symptoms, disease cycle and their management.** 3a: Diseases caused by phytoplasma-Little leaf of Brinjal 3b: Diseases caused by Viruses - **Tobacco mosaic virus** 3c: Diseases caused by Bacteria - **Oily spot of pomegranate** 3d: Diseases caused by Fungi - Rust of soybean, White Rust of Crucifers, Grain smut of Jowar, Tikka disease of Groundnut,	12hrs

	Powdery mildew of Rose Downy mildew of Grapes	
Unit . IV	**Phytopathological skills** 4a: Principles of plant disease management 4b: Classification of fungicides based on chemical nature and Mod of action. 4c: Study of fungicides with reference to properties, formulation, mode of action and uses of Carbendazim and Coppe Oxychloride (COC). **4d: Introduction to forecasting of plant diseases**	06hrs

Total hours : 30

B.Sc. II – Plant Protection

Semester – IV

Theory: 60 Hours (75 Lectures) Credits : 4

Paper II	**DSC 1011D2 : "Weed Science and Insect Pest"** **Section : I "Weed Science"**	**No. of Hours per Unit / Credit**
Unit : I.	**Introduction of weeds** 1a: Weeds – Definition, **Harmful and beneficial effect of weed** 1b: **Characteristic of weeds** 1c: **Classification of weeds** 1d: Weed Biology and Ecology 1e: Study of parasitic , aquatic, poisonous and noxious weeds.	06 hrs
Unit . II.	**Study of following weeds with reference to** a) Gross morphology b) Reproduction c) Ecology d) Dispersal e) Management 1. *Argemone Mexicana* 2. *Portulaca oleracea* 3. *Parthenium hysterophorus* 4. *Eupatorium species* 5. *Alternanthera sessilis* 6. *Amaranthus spinosus* 7. ***Cassia tora*** 8. *Cyperus rotundus* 9. *Cynodon dactylon*	10hrs
Unit. III.	**Methods of weed management** 3a: Mechanical methods - Ploughing, Hoeing, Hand weeding, Mowing, Burning, flooding, Mulching. 3b: Biological methods - Weed management by bacteria, fungi and insects 3c: Chemical methods - Classification of weedicides on the basis of chemical nature, mode of action and its applications. 3d: Study of weedicides with reference to properties, mode of action, formulations and uses of i) Glyphosate ii) Gramoxone (Paraquat dichloride) iii) **Oxyfluorfen (Goal)**.	08hrs
Unit . IV	**Non Insect Pest and House Hold Pest.** 4a: Nematodes 4b: Birds 4c: Rats **4d: Snails** 4e: Household Pests - *Drosophila* , House fly, Mosquito	06hrs

Total hours : 30

B.Sc. II – Plant Protection

Semester – IV

Theory: 60 Hours (75 Lectures) Credits : 4

Paper II	**DSC 1011D2 : "Weed Science and Insect Pest"** **Section : II "Insect Pest "**	**No. of Hours per Unit / Credit**
Unit : I.	**Introduction to insect pests** 1a: Definition and losses caused by insect pests 1b: Causes for Insects to assume pest status 1c: Classification of insect pests based on a) Occurrence of Pest b) Intensity of Pest c) Level of Infestation d) Food requirement **1d. Effect of changing environment on pest incidence**	04 hrs
Unit . II.	**Study of insect pests** 2a: 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 practices Maize - **Fall army worm of Maize** Sugarcane – White grub Gram – Pod borer Mango – Hoppers Brinjal – Top shoot borer Rose – Bud borer 2b: Stored grain pests and their management. i) Rice weevil ii) Pulse beetle	12hrs
Unit. III.	**Management of Insect pests.** 3a: Principles of insect pest control. 3b: Classification of insecticides based on: a) Mode of entry – stomach, contact, systemic and fumigants b) Mode of action – Respiratory, Nervous syatem c) Chemical nature – i) Inorganic ii) Organic – Chlorinated hydrocarbons, Organophosphates Carbamates, Synthetic pyrethroids	10hrs

	iii) Plant origin pesticides (Syn. Green pesticides, Botanical pesticides) d) Need of Formulation and Adjuvant e) Nature of formulation – Dusts, Granules, Wettable powder, Emulsifiable concentrates. **3c : Utilization of entomopathogenic nematodes in IPM.**	
Unit . IV	**Recent trends in pest management** 4.1 a) Attractants b) Repellents c) Antifeedents d) Pheromones e) Chemosterilants f) Precautionary measures used during pesticide application. **4.2 Role of Biotechnology approaches in pest management.** **Transgenics – Benefits and Risks**	04hrs

Total hours : 30

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B.Sc. Part II CBCS syllabus with effect from 2022 -2023

Plant Protection

"General agriculture and Weed Science "

PRACTICAL – I (Section I of Paper I and II)

1-8] Agronomic studies of following crops with reference to gross morphology and agronomic conditions :-

Rice, Soybean, Gram, Sugarcane, Mango, Brinjal , Turmeric, Rose.

9-17] Study of following weeds with reference to gross morphology, reproduction, dispersal and management.

A. Dicot weeds :

Argemone mexicana
Parthenium hysterophorus
Amaranthus spinosus
Alternanthera sessilis
Cassia tora
Eupatorium species
Portulaca oleracea

B. Monocot weeds

Cyperus rotundus
Cynodon dactylon

18] Study of Weed Population by Quadrat method.

19] Study of mode of dispersal in following weeds.

Parthenium hysterophorus
Tridax proucmbens
Xanthium straumarium
Alternanthera sps.
Achyranthus aspera
Cynodon dactylon

20] Herbicidal action on seed germination of any local available weed as per syllabus.

21] Study of Herbicides, Nematicides and Rodenticides with reference to properties, mode of action formulation and uses.

22] Collection of weed and Preparation of Weed Herbarium.

23] Determination of sucrose percentage by Hand refractometer in Sugarcane and Grape.

24] Determination of pH and electrical conductivity of two soil samples from Crop fields.
25] Determination of soil moisture from crop fields (Two samples).
26] Study of Herbicide label information and preparation of list of commonly available herbicide.
27] Demonstration of method of herbicide application.
28] Visit to agriculture field or agriculture institute.

Distribution of Marks	
PRACTICAL – I	**Marks**
1) General Agriculture	20
2) Weed Science	20
3) Journal	05
4) Field visit / Tour report	05
Total	**50**

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B.Sc. Part II CBCS syllabus with effect from 2022 - 2023

Plant Protection

" Plant Pathology and Insect Pest "

PRACTICAL – II (Based on Section II of Paper I and II)

1-9] Study of following diseases of 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) / Leaf Curl of Chilli

C) Bacterial Disease - Citrus canker / Wilt of Brinjal (Ooze test)

D) Fungal Diseases:

a) White rust of *Amaranthus* / Crucifers

b) Rust of Soybean

c) Grain smut of Jowar

d) Tikka disease of Groundnut

e) Powdery mildew of Rose

f) Downy mildew of Grapes

10] Methods of sterilization and disinfection.

11] Preparation and sterilization of Potato Dextrose Agar (P.D.A.) / Nutrient Agar (N.A).

12] Soil Fungi : Isolation, Inoculation and quantification of soil fungi.

13] Soil Bacteria : Isolation, Inoculation and quantification of soil bacteria.

14] Technique of collection and preservation of insect pests.

a. Wet preservation b. Dry preservation

15- 20] 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 – Hoppers
e. Brinjal – Top shoot borer
f. Rose – Bud Borer

21] Study of following stored grain pests as per above points.

a.Rice weevil b.Pulse bettle

22-23] Separation of amino acids from healthy and diseased plants using paper Chromatography technique.

24] Study of pesticide application equipment: Sprayer and its types.

25] Preparation of pesticides for application (Examples).

26-27] Study of Bactericides and Fungicides (Preparation of Bordeaux mixture and Bordo paste) with reference to properties, mode of action formulation and uses.

28] Project work.

Distribution of Marks	
PRACTICAL – II	**Marks**
1) Plant Pathology	18
2) Insect pests	17
3) Project Work	5
4) Journal	5
5) Submission	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 Incharge 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, Polyhouses
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.

References

PAPER I: "General Agriculture and Plant Pathology "

Sr. No.	Name of the Book	Author (s)
1.	Agronomy	V. J. Vaidya *et. al.*
2	Biofertilizers in Agriculture	Subbo Rao
3	Commercial Vegetable Growing	Tind all
4	Crop production and field experimentation	Vaidya Sahastrabudhe and Khupse
5	Cropping System and Theory	Chattarjee

6	Floriculture	Waurie and Ries
7	Handbook of Agriculture	IARI, New Delhi
8	High Yielding Varieties of Crops	Mahabal Ram
9	Identification of Crop Varieties	Agarwal
10	Irrigation	Michael
11	Plant Pathology	R. S. Malhotara
12	Plant Pathology (S Chand Publication)	Dr. P. B. Pandey
13	Pla nt Protection	Mukundan
14	Principles and Procedures of Pla nt Prote ction	Chattopadhyay
15	Roses	Tony Gregory
16	Scientific Crop Production	Mathur
17	Sugarcane	C. N. Babu
18	Sugarc ane Cultivation	M. G. Jadhav
19	The culture of Vegetables and Flowers from Seeds and Root.	Martin Sutton
20	Vegetable growing in India	P.S. Arya Prakash
21	Chemistry of insecticides and fungicide	D. S. Sreeramalu
22	Disease of crops plants in India	Rangaswami
23	Fungi and Diseases in Plants	Butler
24	Fungicides in Disease Control	Y. L. Nene
25	Introduction to plant viruses	C. L. Mandahar
26	Plant disease and epidemiology	Narayanan
27	Plant disease	R. S.Singh
28	Pla nt Pathology	R. P. Singh
29	Pla nt disease	Mathur

30	Plant disease Gopal	S. Dasgupta
31	10. Pla nt Pathogens	Singh R. S.
32	Plant Pathology	P. D. Sharma
33	Pla nt Pathology	Walker
34	Post Harvest technology of Cereals, Pulses and Oilseeds	Chakravarty
35	Viruses and Mycoplasma Diseases of Plants	Ray Chaudhari

PAPER II: " Weed Science and Insect Pest "

Sr. No.	**Name of the Book**	**Author (s)**
1.	Agricultural Pests of India and Southeast Asia	Atwal
2	An Introduction to Entomology	P.D. Srivastava
3	Entomology	Pramod Kumar
4	General Entomology	M.S. Mari
5	Insect Pests of Crops	Prad han and Jotwam
6	Introduction of Pest Management	Dhaliwal and Aruna
7	Introduction to Insect Pest Management	Metculf
8	Modern Entomology	Tembhare
9	Nematode Diseases of Agric ultural Crops	Abstra cts of 8th All Union Conference
10	Pest Control	Van Emden
11	Plant Protection (Principles and Pra ctice)	Mukundan J.R.
12	Principles of Weed Science	Rao V.S.
13	Scientific Weed Management	Gupta O.P.
14.	Weed Control and as Science	Klingmein

15.	Weed Science	Thakur
16.	Weeds of the world	King
17.	World Guide to Insects Vol. I & II.	Paekard A.S
18.	Plant Disease Epidominology	Nagrajan
19.	Experimental and Conc eptual Plant Pathology	Singh *et al*
20.	Weed Weedicides and Weed control Principle and Pra ctice	R. C. Mandal
21.	Soils and Soil Management	Gustafson
22.	Concepts in Integrated Pest Management	Norris *et al*
23.	Seed Science and Technology La b manual	McDonald & Copeland
24.	Seed Technology	Agarwal
5.	Vegetable Crops Vol. I & II ed.	Bose *et al*
26	Hand Book of Horticulture ICAR	K.L. Chandha
27.	Commercial Flowers - Vol. I & II	Bose *et al*
28.	Fruits-Tropic al & Subtropic al - Vol. I	Bose *et al.*
29.	Irrigation	Micheal

B.Sc. Part II : Plant Protection (DSC 1011C2 & DSC 1011D2)

Semester : III & IV **Paper : SEC**

"General Agriculture"

Course Outcomes:

1. To study and acquaint with basic knowledge of agriculture and its allied branches.

2. Students will know principles of agriculture practices, modern systems of farming of agricultural crops and best cropping management suitable in local climate.

List of Experiments:

1) Agronomic studies of following crops with reference to gross morphology and agronomic conditions of Rice, Soybean, Gram, Sugarcane, Mango, Brinjal , Turmeric, Rose.

2) Study of Fungal Diseases:

a) White rust of *Amaranthus* / Crucifers

b) Rust of Soybean

c) Grain smut of Jowar

d) Tikka disease of Groundnut

e) Powdery mildew of Rose

f) Downy mildew of Grapes

3) Technique of collection and preservation of insect pests a) Wet preservation
b) Dry preservation

4) Preparation and sterilization of Potato Dextrose Agar (P.D.A.) / Nutrient Agar(N.A).

5) Study of pesticide application equipment: Sprayer and its types.

6) Study of Bactericides and Fungicides (Preparation of Bordeaux mixture and Bordo paste) with reference to properties, mode of action formulation and uses.

7) Study of Herbicides, Nematicides and Rodenticides with reference to properties, mode of action , formulation and uses.

8) General account of Biofertilisers used in Agronomy.
1. Blue green algae or *Cyanobacteria* 2. *Rhizobium* 3.Mycorrhizal association

9) Organic Farming- Green manuring.

10) Green pesticides/ Botanical pesticides : Neem, *Chrysanthemum* and Tobacco.