

“ Education for Knowledge, Science and Culture.”

– Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanand Shikshan Sanstha's

**VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)**



**Syllabus  
for  
Bachelor of Science**

**B.Sc. Part - II PLANT PROTECTION  
(Semester-III & IV)**

**Under Choice Based Credit System**

**CBCS Syllabus to be implemented from 2022 – 2023**

(Subject to modifications in the future)



## CHOICE BASED CREDIT SYSTEM

### B.Sc. II (Sem. – III and IV) Plant Protection

#### Course Structure

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



## CHOICE BASED CREDIT SYSTEM

### B.Sc. - II: Plant Protection

#### Paper - I “General Agriculture and Plant Pathology”

(DSC – 1012 C2)

#### Section I: General Agriculture


**Course Outcomes: On completion of the course, students will be able to:**

CO1: Study and acquaint with basic knowledge of agriculture and its allied branches.

CO 2: Know principles of agriculture practices, modern systems of farming of agricultural crops and best cropping management suitable in local climate.

CO 3: Know the cultural and mechanical methods of plant protection.

CO 4: Know the biological & legal methods of plant protection.

Paper I	DSC – 1012 C2 : “General Agriculture and Plant Pathology” Section : I General Agriculture	No. of Hours per Unit / Credit
Unit: I.	<b>Introduction of agriculture and study of major crops</b> 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 – <b>Rice</b> B. Oil seed crop – <b>Soybean</b> 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 diseases and 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	07hrs

	<p>a) Organic Farming – Introduction, Importance, Limitations.</p> <p>b) Transgenic methods ( <i>Agrobacterium</i> mediated gene transfer ) , Examples of Transgenic crops.</p>	
Unit. III.	<p><b>Methods of Plant Protection part - I.</b></p> <p>3a: Cultural methods – Tillage, crop rotation, trap crops, fertilizer applications, <b>land fallowing, timely sowing and proper soil selection.</b></p> <p>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 the pests and <b>Pheromone traps.</b></p> <p>3c: Physical methods – Heat and soil solarisation</p>	06hrs
Unit. IV	<p><b>Methods of Plant Protection part – II.</b></p> <p>Bactericides, Fungicides, Insecticides, Nematicides, Acaricides , Molluscicides and Rodenticides</p> <p>4b: Biological methods – Definition, Important biocontrol agents.</p> <p>a) Fungi : ( <i>Trichoderma, Metarhizium, Verticillium</i> )</p> <p>b) Bacteria : <i>Pseudomonas, Bacillus</i></p> <p>c) Insect : <i>Crysopyrilla / Trichogramma</i></p> <p><b>d) Virus</b></p> <p>4c: Legal methods – Plant quarantine in India.</p> <p>4d: Crop resistance – Uses of resistant varieties and their examples</p>	10hrs

**Total hours: 30**

**References:**

- 1) Agarwal, Identification of Crop Variety , Science Publishers, New Delhi.
- 2) Chattarjee, Cropping system and theory, Oxford and IBH Publishing, Co. Pvt. Ltd, New Delhi.
- 3) Subbo Rao, Biofertilizers in Agriculture, CBS publishers and distributors Pvt. Ltd. New Delhi.
- 4) V. J. Vaidya *et.al*, Agronomy, Continental publication, Lucknow.



**CHOICE BASED CREDIT SYSTEM**

**B.Sc. - II: Plant Protection**

**Paper - I “General Agriculture and Plant Pathology”**

(DSC – 1012 C2)

**Section II: Plant Pathology**

**Course Outcomes: On completion of the course, students will be able to:**

CO1: Know symptoms, etiology, disease cycle and management of major diseases of field crops.

CO 2: Acquaint with different strategies for management of plant diseases.

CO 3: Know different phytopathological skills.

CO 4: Know different plant diseases and their management.

<b>Paper I</b>	<b>DSC – 1012 C2 : “General Agriculture and Plant Pathology”</b> <b>Section : II Plant Pathology</b>	<b>No. of Hours per Unit / Credit</b>
Unit : I.	<p><b>Crop diseases</b></p> <p>1a: Introduction and importance of Plant Pathology.</p> <p>1b: Definition and concept of disease, Terminologies used in Plant Pathology: Host, Pathogen, Inoculum, Virulence, Pathogenicity, Pathogenesis, Prediposition, Symptoms, Infection, Incubation period, Etiology, Disease cycle, Resistance, Susceptibility, Immunity, Hypersensitivity, Cross protection, Phytoalexins, Siderophores, <b>Inoculum potential, Dissemination Virus, Mycoplasma, Viroid.</b></p> <p>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) <b>epidemiology</b></p> <p>1d. Symptoms and signs of plant diseases ( Chlorosis, Necrosis, Mildew, Rust and Smuts)</p> <p>1e: Methods of studying plant pathogens and Koch’s Postulates</p> <ul style="list-style-type: none"><li>a) Isolation of Fungi and Bacteria</li><li>b) Methods of purification of Fungi and Bacteria</li><li>c) Koch’s Postulates</li></ul>	07 hrs.



Unit. II.	<p><b>Mechanism of plant infection</b></p> <p>2a: Mechanism of infection ( Fungi, Bacteria and Virus)</p> <p>2b: Factors affecting infection</p>	05hrs
Unit. III.	<p><b>Study of following crop diseases with reference to pathogen, symptoms, disease cycle and their management.</b></p> <p>3a: Diseases caused by phytoplasma- Little leaf of Brinjal</p> <p>3b: Diseases caused by Viruses - <b>Tobacco mosaic virus</b></p> <p>3c: Diseases caused by Bacteria - <b>Oily spot of pomegranate</b></p> <p>3d: Diseases caused by Fungi - Rust of soybean, White Rust of Crucifers, Grain smut of Jowar, Tikka disease of Groundnut, Powdery mildew of Rose Downy mildew of Grapes</p>	12hrs
Unit . IV	<p><b>Phytopathological skills</b></p> <p>4a: Principles of plant disease management</p> <p>4b: Classification of fungicides based on chemical nature and Mode of action.</p> <p>4c: Study of fungicides with reference to properties, formulation, mode of action and uses of Carbendazim and Coppe Oxychloride (COC).</p> <p><b>4d: Introduction to forecasting of plant diseases</b></p>	06hrs

**Total hours: 30**

**References:**

- 1) Chattopadhyav, Principles and Procedures of plant protection, Oxford and IBH Publishing, Co. Pvt. Ltd, New Delhi.
- 2) R. S. Malhotara, Plant Pathology, VISIONIAS publishers, New Delhi.
- 3) P. B. Pandey, Plant Pathology, S. Chand Publication, New Delhi.
- 4) Rangaswami, Diseases of crops plants in India, PHI learning Pvt. Ltd., New Delhi.



## CHOICE BASED CREDIT SYSTEM

### B.Sc. - II: Plant Protection

#### Paper-II: “Weed Science and Insect Pest”

(DSC – 1011 D2)

#### Section I: Weed Science

**Course Outcomes: On completion of the course, students will be able to:**

CO1: Acquaint the basic knowledge of weed science.

CO 2: Reveal safe, economic and effective weed management practices.

CO 3: Know different methods of weed management.

CO 4: Know different non insect pest and house hold pest.

Paper II	DSC 1011D2 : “Weed Science and Insect Pest” Section : I Weed Science	No. of Hours per Unit / Credit
Unit : I.	<b>Introduction of weeds</b> 1a: Weeds – Definition, <b>Harmful and beneficial effect of weed</b> 1b: <b>Characteristic of weeds</b> 1c: <b>Classification of weeds</b> 1d: Weed Biology and Ecology 1e: Study of parasitic , aquatic, poisonous and noxious weeds.	06 hrs
Unit . II.	<b>Study of following weeds with reference to</b> a) Gross morphology b) Reproduction c) Ecology d) Dispersal e) Management 1. <i>Argemone Mexicana</i> 2. <i>Portulaca oleracea</i> 3. <i>Parthenium hysterophorus</i> 4. <i>Eupatorium species</i> 5. <i>Alternanthera sessilis</i> 6. <i>Amaranthus spinosus</i> 7. <b><i>Cassia tora</i></b> 8. <i>Cyperus rotundus</i> 9. <i>Cynodon dactylon</i>	10hrs
Unit. III.	<b>Methods of weed management</b> 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,	08hrs



	formulations and uses of i) Glyphosate ii) Gramoxone (Paraquat dichloride) iii) <b>Oxyfluorfen (Goal)</b>	
Unit . IV	<b>Non Insect Pest and House Hold Pest.</b> 4a: Nematodes 4b: Birds 4c: Rats <b>4d: Snails</b> 4e: Household Pests - <i>Drosophila</i> , House fly, Mosquito	06hrs

**Total hours: 30**

**References:**

- 1) Gupta O. P., Scientific weed management, Today and Tomorrow, New Delhi.
- 2) Joshi, Weed control Manual of, N. C. Research Publication, Delhi.
- 3) King, Weed of the world, L. J. Wiley, Eastern Mumbai.
- 4) Rao V. S., Principles of weed science, Oxford and IBH Publishing, Co. Pvt. Ltd, New Delhi.
- 5) Thakur, Weed Science, C. Metropolitan, New Delhi.





## CHOICE BASED CREDIT SYSTEM

### B.Sc. - II: Plant Protection

#### Paper-II: “Weed Science and Insect Pest”

(DSC – 1011 D2)

#### Section II: Insect Pest

**Course Outcomes: On completion of the course, students will be able to:**

CO1: Familiarize about nomenclature, nature of damage and seasonal incidence of insect pests that cause loss to major field crops.

CO2: Familiarize integrated pest management practices.

CO 3: Familiarize different methods of pest management.

CO 4: Know the recent trends in pest management.

<b>Paper II</b>	<b>DSC 1011D2 : “Weed Science and Insect Pest”</b> <b>Section : II Insect Pest</b>	<b>No. of Hours per Unit / Credit</b>
Unit : I.	<b>Introduction to insect pests</b> 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 <b>1d. Effect of changing environment on pest incidence</b>	04 hrs
Unit . II.	<b>Study of insect pests</b> 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 - <b>Fall army worm of Maize</b> Sugarcane – White grub Gram – Pod borer Mango – Hoppers Brinjal – Top shoot borer Rose – Bud borer 2b: Stored grain pests and their management.	12hrs



	i) Rice weevil ii) Pulse beetle	
Unit. III.	<p><b>Management of Insect pests.</b></p> <p>3a: Principles of insect pest control.</p> <p>3b: Classification of insecticides based on:</p> <p>a) Mode of entry – stomach, contact, systemic and fumigants</p> <p>b) Mode of action – Respiratory, Nervous system</p> <p>c) Chemical nature –</p> <p>i) Inorganic</p> <p>ii) Organic – Chlorinated hydrocarbons, Organophosphates Carbamates, Synthetic pyrethroids</p> <p>iii) Plant origin pesticides ( Syn. Green pesticides, Botanical pesticides)</p> <p>d) Need of Formulation and Adjuvant</p> <p>e) Nature of formulation – Dusts, Granules, Wettable powder, Emulsifiable concentrates.</p> <p><b>3c : Utilization of entomopathogenic nematodes in IPM.</b></p>	10hrs
Unit . IV	<p><b>Recent trends in pest management</b></p> <p>4.1 a) Attractants b) Repellents c) Antifeedents d) Pheromones e) Chemosterilants f) Precautionary measures used during pesticide application.</p> <p><b>4.2 Role of Biotechnology approaches in pest management.</b></p> <p><b>Transgenics – Benefits and Risks</b></p>	04hrs

**Total hours: 30**

**References:**

- 1) Dhaliwal and Aruna, Introduction of pest management, Kalyani Publishers, New Delhi.
- 2) M. S. Mani, General Entomology, Oxford and IBH Publishing, Co. Pvt. Ltd, New Delhi.
- 3) P. D. Srivastava, An Introduction to Entomology, Concept publication company, Delhi.
- 4) Pramod Kumar, Entomology, Sarup and sons publishers, Lucknow.
- 5) Pradhan and Jotwam, Insect pest of crops, NBT Publishers, New Delhi.



## CHOICE BASED CREDIT SYSTEM

**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 proucbens*  
*Xanthium strumarium*  
*Alternanthera sps.*  
*Achyranthus aspera*  
*Cynodon dactylon*



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

- 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.

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



## CHOICE BASED CREDIT SYSTEM

**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



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

- 21] Study of following stored grain pests as per above points.  
a.Rice weevil            b.Pulse beetle
- 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.

<b>Distribution of Marks</b>	
<b>PRACTICAL – II</b>	<b>Marks</b>
1) Plant Pathology	18
2) Insect pests	17
3) Project Work	5
4) Journal	5
5) Submission	5
<b>Total</b>	<b>50</b>



## CHOICE BASED CREDIT SYSTEM

### 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 collector 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.



## CHOICE BASED CREDIT SYSTEM

### GUIDELINES FOR PROJECT REPORT SUBMISSION:

1. It should be of 10 to 15 pages, well certified by the teachers in charge & 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.





**CHOICE BASED CREDIT SYSTEM**  
**B.Sc. II (Sem. III & IV) Plant Protection**  
**Evaluation Pattern**  
**With effect from 2022-23**

Paper No.	Title of the paper	Course Code	Semester End Examination	Continuous Internal Evaluation Marks	Total Marks
I - Sec. I	General Agriculture	DSC 1012C2	35	15	50
I - Sec. II	Plant Pathology	DSC1012C2	35	15	50
II - Sec. I	Weed Science	DSC1011D2	35	15	50
II - Sec. II	Insect Pest	DSC1011D2	35	15	50



**CHOICE BASED CREDIT SYSTEM**  
**B.Sc. II (Sem. III & IV) Plant Protection**  
**Semester End Examination**  
**Structure of Question Paper**

**Total Marks: 35**

**Time: 2 hours**

Question No.	Question Pattern	Marks
Q.1	A) Select correct alternative. (MCQ). B) Fill in the blanks.	05 02
Q.2	Attempt any two. (Long answer questions).	16
Q.3	Attempt any four. (Short notes).	12
	Total	35

**B.Sc. II (Sem. III & IV) Plant Protection**  
**Continuous Internal Evaluation (CIE)**

Evaluation Type	Marks
Home Assignment/Book Review/ Student Project/Test/PPT Presentation	15

