SHIVAJI UNIVERSITY, KOLHAPUR

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Accredited By NAAC

Revised Syllabus For
Bachelor of Science (part III) Botany,
Seed Technology
&
Plant Protection

(Subject to modifications to be made time to time)

Syllabus to be implemented from June 2010

A) SHIVAJI UNIVERSITY, KOLHAPUR

Revised Syllabus For Bachelor of Science

B.Sc. III Botany (Optional), Seed Technology (Vocational), Plant Protection (IDS)

GENERAL OBJECTIVES OF COURSE

(As applicable to Degree Course)

OBJECTIVES: -

- To impart knowledge of Science is the basic objective of education.
- To develop scientific attitude is the major objective to make the students open minded, critical, curious.
- 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.
- To understand scientific terms, concepts, facts, phenomenon and their relationships.
- To make the students aware of natural resources and environment.
- 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.
- 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.
- 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.
- To create the interest of the society in the subject and scientific hobbies, exhibitions and other similar activities.
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DURATION: -

- The course shall be of full time course.
- The duration of course shall be of three years.

PATTERN: -

- Pattern of Examination will be Annual.

ADMISSION PROCEDURE: -

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

MEDIUM OF INSTRUCTION: -

- The medium of instruction shall be in English.

STRUCTURE OF COURSE: -

B.Sc. III – Botany (Optional)

Sr.No.	Paper Number	Marks
1	Paper- V	100
2	Paper -VI	100
3	Paper -VII	100
4	Paper -VIII	100
5	Practical- I	50
6	Practical- II	50
7	Practical -III	50
8	Practical -IV	50
9	**Total**	**600**

B.Sc. III – Seed Technology (Vocational)

Sr.No.	Paper Number	Marks
1	Paper- V (BOTANY)	100
2	Paper -VI (BOTANY)	100
3	Paper –VI (ST)	100
4	Paper -VIII (ST)	100
5	Practical- I (BOTANY)	50
6	Practical- II (BOTANY)	50
7	Practical -III (ST)	50
8	Practical IV (ST)	50
9	**Total**	**600**

B.Sc. III – Plant Protection (IDS)

Sr.No.	Paper Number	Marks
1	Paper- V (BOTANY)	100
2	Paper -VI (BOTANY)	100
3	Paper –VI (PP)	100
4	Paper -VIII (PP)	100
5	Practical- I (BOTANY)	50
6	Practical- II (BOTANY)	50
7	Practical -III (PP)	50
8	Practical IV (PP)	50
9	**Total**	**600**

SCHEME OF TEACHING
B.Sc. III Botany (Optional)

Sr. No.	Paper /Practical	Teaching Hrs. Per Week			
		L	T	P	Total
1	Paper V	3	-	-	
2	Paper VI	3	-	-	
3	Paper VII	3	-	-	
4	Paper VIII	3	-	-	
5	Practical I	-	-	5	
6	Practical II	-	-	5	
7	Practical III	-	-	5	
8	Practical IV	-	-	5	
9	**Total**	12		20	32

B.Sc. III Seed Technology (Vocational)

Sr. No.	Paper /Practical	Teaching Hrs. Per Week			
		L	T	P	Total
1	Paper V (Botany)	3	-	-	
2	Paper VI (Botany)	3	-	-	
3	Paper V (Seed Tech)	3	-	-	
4	Paper VI (Seed Tech)	3	-	-	
5	Practical I (Bot.)	-	-	5	
6	Practical II (Bot.)	-	-	5	
7	Practical III (ST)	-	-	5	
8	Practical IV (ST)	-	-	5	
9	**Total**	12		20	32

B.Sc. III Plant Protection (IDS)

Sr. No.	Paper /Practical	Teaching Hrs. Per Week			
		L	T	P	Total
1	Paper V (Botany)	3	-	-	
2	Paper VI (Botany)	3	-	-	
3	Paper V (Plant Prot)	3	-	-	
4	Paper VI (Plant Prot)	3	-	-	
5	Practical I (Bot.)	-	-	5	
6	Practical II (Bot.)	-	-	5	
7	Practical III (PP)	-	-	5	
8	Practical IV (PP)	-	-	5	
9	**Total**	12		20	32

SCHEME OF EXAMINATION: -

- The examination shall be at the **end** of each academic year.
- Each theory shall be carry **100** marks.
- The evaluation of performance of the students in the theory papers shall be on the basis of annual examination of **100 marks per paper.**
- Question papers will be set in the view of the / in accordance with the entire syllabus and preferably covering **each unit** of the syllabus.

STANDARD OF PASSING: -

- As prescribed under rules and regulations for each degree course.

NATURE OF QUESTION PAPER AND SCHEME OF MARKING: -

- Refer copy of revised syllabus.

OTHER FEATURES: -

- **In capacity / Number of students** is as per university rules.
- **Teachers qualifications** is as per laid down by Govt. Of Maharashtra and Shivaji University, Kolhapur.
- **Workload** for each teacher is 20 lectures per week.
- **Workload details** should be as per Apex body / UGC / State of Maharashtra / Shivaji University norms.
- **Library be equipped with Required Reference and Textbooks, Journals, Periodicals** for higher and advanced studies are as per stated in revised syllabus and approved by BOS.
- **Specific Equipments** like TV, LCD,OHP, PCs with necessary software and operating systems etc.are necessary to run the course.

LABORATORY SAFETY EQUIPEMENTS: -

- Fire extinguishers **at least two** sets in each laboratory of 600 sq.ft. Area.
- Leakage of gases be avoided.
- First aid kit be made available.
- 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.

LABORATORY INSTRUCTIONS: -

- Always wear an apron inside the laboratory.
- Do not eat or drink in laboratory.
- Do not place pencil, fingers or any material in the mouth. Moisten labels with water.
- Use microscopes and other equipments carefully.
- Discard all used glassware such as test tubes, pipettes, petry-plates, glass slides in a receptacle meant for it.
- Put cotton plugs, papers, matches, waste dissected material etc. in a waste-paper basket.
- Regard all cultures as pathogenic. Take every precaution against infection.
- Report all accidents to the instructor immediately.
- Wash hands thoroughly with soap and water before and after the experiment.
- Always turn off water, gas and electricity before leaving the laboratory.
- While entering the lab the students should have a laboratory journal, pencil and eraser, foot role, dissection box with necessary dissecting instruments and a small napkin.
- All drawings must be made with drawing pencil only.
- As the journal is to represent student's bonafide work during the whole year, the student keep it as clean as possible and **DO NOT LOOSE IT**.
- The students should not forget that unless their journals are certified, they are not allowed to appear for the university examination.

SHIVAJI UNIVERSITY, KOLHAPUR.

Revised Syllabus

B.Sc. III Plant Protection

(To be implemented from June 2010)

1. COURSE STRUCTURE

A)Theory Paper III : 2 Sections (50 Marks each)	: 100 Marks
B) Theory Paper IV : 2 Sections (50 Marks each)	: 100 Marks
C) Practical I	: 50 Marks
D) Practical II	: 50 Marks
Total Marks a) Theory	: 200
b) Practical	: 100

	300

2. Paper titles :-

Paper III :- Plant Pathogens,Insect Pests and Their Management.

Section –I : Plant Pathogens and Their Management.

Section-II : Plant Insect Pests and Their Management.

Paper-IV :- Techniques In Plant Protection.

Section-I : Field Techniques In Plant Protection.

Section-II : Laboratory Techniques In Plant Protection.

SHIVAJI UNIVERSITY, KOLHAPUR.

Revised SYLLABUS : B.Sc. III, PLANT PROTECTION.

(TO BE IMPLEMENTED FROM JUNE 2010)

PAPER –III

PLANT PATHOGENS,INSECT PESTS AND THEIR MANAGEMENT.

SECTION-I (UNITS 1 TO 4)

PLANT PATHOGENS AND THEIR MANAGEMENT.

(Total Periods – 80)

UNIT 1:-

SUB-UNIT 1:- Plant Pathology : History, Progress, losses due to pathogens, importance of study of plant pathology (2)

SUB-UNIT 2:- Research in Plant Pathology:-

2.1 Contribution of Indian Plant Pathologists (any four) (2)

2.2 Contribution of Research institutes a) IARI (Indian Agricultural Research Institute) b) ICRISAT (International Crop Research Institute for Semi Arid Tropics) c) NPPRI (National Plant Protection Research Institute) with reference to plant pathology. d) Agharkar Research Institute Pune (3)

SUB-UNIT 3:- Biological Control of Plant Diseases

3.1: Definition, Importance, Biological control agents and their role in plant disease control (2)

UNIT 2:-

SUB-UNIT 1:- Plant Diseases : Study of plant diseases with respect to symptoms, causal organism, disease cycle and their management.

1.1. Cereals	a) Wheat –	i) Black stem rust.
	b) Jowar –	i) Head smut. ii) Rust
1.2. Pulses	a) Bean -	i) Powdery mildew. ii)Anthracnose
1.3. Vegetables	a) Tomato -	i) Late blight of Tomato/Early blight of Tomato.
	b) *Amaranthus* -	i) White rust.
	c) Onion -	i) *Aspergillus* - Black rot
1.4. Oil seed crop	a) Groundnut -	i) Tikka.
	b) Sunflower -	i) Rust/ any other available disease. (10)

UNIT 3:-

SUB-UNIT 1:-Plant Diseases : Study of plant diseases with respect to symptoms, causal organism, disease cycle and their management.

1.1.Cash crops	a) Chilli -	i) Leaf spot disease.
	b) Tobacco -	i) Leaf curl ii) Root knot nematode disease of any solanceae crop
1.2.Ornamentals :	a) Rose/ *Nyctanthus* -	Powdery mildew
1.3.Fruit plants	a) Sigatoka(Leaf spot) of Banana.	
	b) Rust of Fig.	
	c) Leaf & fruit, black spot of Pomegranate.(only symptoms)	
1.4.Forest trees.	a) Rust of *Dalbergia.*	
	b) *Phyllachora* on *Ficus*	
	c) Sooty mold of any forest tree (10)	

UNIT 4:-

SUB-UNIT 1:-Fungicides.:-

1.1 Definition, classification, characters of an ideal fungicide. (2)

1.2 Study of fungicides with respect to Properties ,formulations, methods of application, mode of action and uses.

1.2.A: Sulphur fungicides - a) Inorganic – Wettable sulphur.
b) Organic – Thiram.

1.2 B: Copper Fungicides – a) Bordeaux mixture and pest
b) Copper Oxychloride

1.2.C: Mercury fungicides - a) Mercuric chloride
b) Ceresan

1.2.D: Heterocyclic Nitrogenous Compounds- Captan.

1.2.E : Benzene Compounds – Dexon.

1.2.F: Antibiotics - a) Streptomycin.
b) Aureofungin.

1.2.G: Systemic Fungicides a) Carbadanzin(Bavistin) b) Vitavax (9)

40

SECTION –II (UNITS 5 TO 8)
PLANT INSECT PESTS AND THEIR MANAGEMENT.

UNIT 5:-

SUB-UNIT 1:- Plant Insect Pests :-Study of major pests with reference to scientific name,marks of identification, host range, life cycle, perpetuation, nature of damage and management.

1.1 Major Crop Insect pests.

1.1 A : Cereals	a) Paddy	- Leaf hopper.
	b) Jowar	- Army worm.
1.1 B: Pulses	a) Green Peas	- Pod borer.
	b) Beans	- Aphids .
1.1 C: Vegetables	a) Bhendi	- Fruit borer.
	b) Cabbage	- Caterpillar.
1.1 D: Fruits	a) Custard apple	- Mealy bugs.
	b) Ber/Guava	- Fruit –fly.
	c) Pomegranate	- Butter-fly.
1.1 E: Ornamentals	a) Rose	- Aphids
	b) Chrysanthemum /any flower plant	- Leaf miner.
1.2.Polyphagus insect pests –	i) Termites	ii) White Grub
	iii) Whitefly.	(14)

UNIT 6:-

SUB-UNIT 1:- Insecticides :-

1.1. Definition, classification ,characters of an ideal insecticide. (2)

SUB-UNIT 2:-

2.1. Study of major insecticides with respect to properties, formulations, methods of application, mode of action and uses.

2.2.A: Plant origin insecticides-	a) Azadirachtin		
2.3.B: Chlorinated hydrocarbons –	a) Lindane	b)Endosulfan.	
2.4.C: Organophosphate –	a) Malathion	b) Phorate.	
2.5.D: Carbamate –	a) Carbaryl	b) Propoxur.	
2.6.E: Synthetic Pyrethroids.	a) Cypermethrin	b) Deltamethrin	
2.7.F: Nematicides :	a) Nemagon	b) Vapam	
2.8.G: Rodenticides :	a) Zinc Phosphoide	b) Bromodiolone	(7)

UNIT 7:-

SUB-UNIT 1:- Importance of toxicological study:-

1.1 Toxicity : Definition, types: - acute & chronic
1.2 L.D.-50
1.3 Colour code
1.4 Antidotes
1.5 General precautions regarding to uses of pesticides (5)

SUB-UNIT 2:- Hazards of insecticides :-

2.1 Symptoms of pesticide poisoning during manufacture and application
2.2 Food contamination and residue pesticides- vegetables and fruits. (4)

UNIT 8:-

SUB-UNIT 1:- Chemical Pest Control and environment :-

1.1 Pollution of soil
1.2 Pollution of water
1.3 Pollution of air (3)

SUB-UNIT 2:- Limitations of Chemical control. (2)

SUB-UNIT 3:- Biological control of insect pests: (2)

SUB-UNIT 4:- Pesticide legislation in India: . (1)

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(40)

PAPER –IV

TECHNIQUES IN PLANT PROTECTION.

(Total Periods – 80)

SECTION-I(UNITS 1–4)

FIELD TECHNIQUES IN PLANT PROTECTION.

UNIT 1

SUB-UNIT 1. Concept of Plant protection as a technique, scope, importance, equipments used inPlant protection. (3)

SUB-UNIT 2. Seed treatment :

2.1: Concept, objectives of seed treatment.

2.2 : Traditional and modern methods of seed treatment.

2.3 : Principle, construction and working of seed dressing equipments.(any two) (4)

SUB-UNIT 3. Soil sterilization :

3.1 : Objectives.

3.2 : Traditional and modern methods of soil sterilization and soil solarization.

3.3 : Soil sterilization equipment –soil injector and chemicals used.

3.4 Role of soil sterilization in Polyhouse farming. (4)

UNIT-2

SUB-UNIT 1. Pesticide application equipments:-

1.1: Study of following sprayers with respect to principle & working.

a) Pneumatic air pump – Hand pump

b) Power operated – Mist blower cum duster

c) Haudrallic energy pump – Foot pump.

d) Types of nozzles : Haudrallic energy, kinetic energy, gaseous energy centrifugal energy.

1.2 Ultra low volume sprayer. (9)

SUB-UNIT 2. Care and maintenance of plant protection equipments and their importance. (2)

UNIT-3

SUB-UNIT 1. Plant Clinic:

1.1: Objectives.importance and requirments .

1.2: Present status of Plant clinic (2)

SUB-UNIT 2. Plant protection museum :-

1.1: Concept, collection and preservation of pathological, entomological specimens and their maintenance.

1.2: Role of museum in awareness of farmers. (3)

SUB-UNIT 3. a) Integrated Pest Management (IPM**)**

b) Integrated Disease Management (IDM) (5)

UNIT 4

SUB-UNIT-1. Breeding technique for disease resistance-

1.1 Introduction

1.2 Selection

1.3 Irradiation and Mutation breeding

1.4 Back cross method - limitations, advantages and achievements of these methods. (8)

(40)

SECTION-II (UNITS 5-8)
LABORATORY TECHNIQUES IN PLANTS

UNIT-5

SUB-UNIT 1. Soil microbiology :-

1.1 Soil microorganisms, definition, common examples.
1.2 Methods of studying soil microorganisms:-
a) Respirometry b) Burried slide method.
1.3 Role of soil microorganims in maintaining soil health. (4)

SUB-UNIT 2. Soil pathology :-

2.1 Soil sickness, causes and remedial measures.
2.2 Role of soil pathogens in plant pathology. (3)

UNIT-6

SUB-UNIT 1. Seed pathology :- (4)

1.1 Concept and importance of seed pathology.
1.2 Seed borne pathogens ,methods to study seed borne pathogens.
1.3 Seed health management

SUB-UNIT 2. Seedling mortality in nursery, causes and management. (1)

SUB-UNIT 3. Market pathology :-

3.1 Concept ,need and significance.
3.2 Techniques involved in the study of market pathology.
3.3 Study of locally available post harvest diseases of fruits and vegetables (5)

UNIT-7

SUB-UNIT 1. Pathophysiology :-

1.1 Concept and causes for changes in physiology of diseased plant.
1.2 Paper Chromatographic techniques in studying pathophysiology. (4)

SUB-UNIT 2. Culture techniques :

2.1 Importance and utility in plant pathology.
2.2 Culture media for isolating specific pathogens(two from each fungi and bacteria).
2.3 Axenic culture for rust. (6)

UNIT-8.

SUB-UNIT 1. Recent techniques in Plant Protection.:- (9)

1.1 GMO's (Genetically Modified Organisms)
1.2 B.T. Cotton
1.3 Pheromones
1.4 Microbial pesticides
1.5 Remote sensing
1.6 Disease forecasting with computer
1.7 E.M.Solution (Effective Microbial Solution)/Eco friendly botanical pesticides.

SUB-UNIT 2. Staining techniques :- Common stains used in plant pathology, their preparation &significance a) Cotton blue b) Gram's stain c) Dien's stain. (2)

SUB-UNIT 3. Plant Quarantine :- Concept and importance as an essential tool in plant Protection. (2)

PLANT PROTECTION B.Sc. III
Practical –I
(Based on Paper-III)

Unit 1

Study of plant diseases as per theory syllabus with respect to host, symptoms, causal organism, any one stage in the life cycle and management.

1. Diseases of cereals.
2. Diseases of pulses.
3. Diseases of vegetables.
4. Diseases of oil seed crops.
5. Diseases of cash crops.
6. Diseases of ornamentals.
7. Diseases of fruit plants
8. Diseases of forest trees.

Unit 2

Study of fungicides as per theory syllabus with respect to properties, formulations, colour code, methods of application, mode of action, antidote and uses.

9 Sulphur, Copper, Mercury, Heterocyclic nitrogenous compounds.
10 Benzene compounds, Antibiotics, Systemic fungicides.
11. Preparation of Bordeaux mixture,Burgundy mixture and Bordeaux paste.

Unit 3

Study of plant insect pests as per theory syllabus with respect to marks of identification, life cycle stages ,nature of damage and management.

12.Insect pests of cereals
13.Insect pests of pulses.
14.Insect pests of vegetables.
15.Insect pests of fruits.
16.Insect pests of ornamentals.
17.Polyphagous insect pests.

Unit 4

18 ,19&20 Study of Insecticides as per theory syllabus.
With respect to active ingredients, properties colour code, formulation, mode of action method of application, antidotes and uses.

21. Study of entomogenous fungi as a biological control agent a) *Aspergillus* b) *Cladosporium* c) *Beauvria.*
22. Study of insects as biological control *Dipha aphidivora*, *Lady bird beetle*
23. Protective appliances used during pesticide applications.

Unit 4

24. Report of a visit to Pesticide industry / Agricultural institute.

Practical –II
(Based on Paper –IV)

Unit 1-

1 Study of plant protection equipments with respect to principle, parts, working, uses and maintenance – any two available spray pumps.(excluding knap sack sprayer and duster.)

2. Study of seed dressing techniques by using traditional methods and seed dresser .

3. Study of techniques involved in collection, killing, preservation and preparation of insect boxes (collection and submission of pests of local crops is expected.)

4. Study of life cycle of any suitable pest by rearing in laboratory (two or three Life cycle stages.)

Unit 2-

5. Study of Hybridization technique with respect to emasculation,pollination, bagging, labelling in Maize ,*Hibiscus* / Cotton / Bhendi.

6. Use of Aerobiological technique to study fungal flora of different localities (by gravity slide method.)

7. Study of rhizosphere fungi by culture technique from different soil samples.

8. Study of any two diseases of nursary plants.

Unit 3

9. Study of Relative Water Content (RWC) of healthy and infected leaf tissue.

10. Data entry of fungal spore measurement (micrometry) in computer and presentation by various statistical diagrams.

11. Sketching of fungal spores with Camera lucida technique.

12. Detection of sugars from healthy and infected leaves by using circular paper chromatography technique.

13. Detection of organic acids from healthy and infected leaves by using circular Paper chromatography technique.

14. Estimation of chlorophylls and carotenoids with the help of colorimeter from healthy and infected leaf tissue.

15. Photomicrography technique and its presentation in computer

Unit 4

16. Study of fungi from locally available seed samples.

17. Study of market pathology of fruits from local market.

18.. Study of Trichoderma culture.

19. Preparation of special culture media for isolation of soil fungi.

20. Agricultural recent techniques in insect management –Pheromone traps, E.M. Solution and other botanical pesticides.

21. Effect of fungicides Thiram and Blitox on culture of soil mycoflora.

22. detection of aflatoxins

Unit 5

23. A report on survey of local diseases and pests by using field visit note book.

Practical Examination Instructions :-

A) Each candidate must produce a certificate from the Head of the Department stating that he /she completed practical course in satisfactory manner recommended by Board of 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 in-charge 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 plant diseases and pests in local areas should be arranged One of the excursions shall be to a Research Institute or Agricultural centers actively engaged in plant protection studies for not more than five 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.

C) Candidates shall be required to present the following at the time of Practical examination.

1.Certified Laboratory Journal.

2.Tour report / visit report / Field visit book.

3.Submission of preserved or dry specimens of diseased plants; preserved insect pests and herbaria of weeds.

4, The candidates will be orally examined in their submission work.

D) Distribution of marks for Practicals.

Practical –I Marks

1. Plant diseases.	10
2. Plant pests.	07
3. Preparation of fungicide	04
4. Identification	14
5. Report of Industrial or Agricultural institute visit.	05
6. Journal	05
7. Submission of Pests, diseases of crops and weeds.	05

	50

Practical –II Marks

1. Pathophysiology	18
2. Micrometry / Camera lucida	05
3 Market pathology / Soil pathology/ Seed pathology / Aerobiology..	05
4. Identification	12
5. Field visit notebook	05
6. Journal	05

	50

SHIVAJI UNIVERSITY, KOLHAPUR

B.Sc. III (NEW COURSE) EXAMINATION,MARCH / APRIL,

PLANT PROTECTION

PRACTICAL- I

Time :- 5 hours Total Marks : 50

11.00 a.m. onwards

N.B.:- Draw neat lebelled sketches wherever necessary.

1. Identify and describe symptoms and causal organism of specimens A and B. Leave your slide for inspection. (10)
2. With the help of marks of identification, identify and describe specimen C and D . Comment on nature of damage and life cycle stage. (7)
3. Prepare the fungicide E as per instructions . (4)
4. Identification.
   - i) Comment on the mode of action and uses of specimen E & F. (5)
   - ii) Identify and comment on specimen G. (2)
   - iii) Comment on the use of specimen H. (2)
   - iv) Comment on slide / specimen I & J. (5)
5. Report of a Visit and Journal. (10)
6. Submission. (5)

SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. III (NEW COURSE) EXAMINATION,MARCH / APRIL,
PLANT PROTECTION
PRACTICAL- II

Time :- 5 hours Total Marks : 50
11.00 a.m. onwards

1. With the help of paper chromatography technique spot out organic acids / sugars from the given leaf extracts A and B. (10)
2. Estimate the Chlorophyll's / Carotenoids from the given samples C and D. (8)
3. Sketch the camera lucida drawing or
   Measure the spore dimensions, of E by using micrometry. (5)
4. Identify and describe fungal specimens from culture F of fruit / seed /air (5)
5. Identification. (12)
   i) Comment on working and uses of G.
   ii) Identify and describe the stage H in hybridization technique.
   iii) Identify and comment on uses of stain I.
   iv) Comment on the plant protection technique J.
6. Field visit notebook. (5)
7. Journal. (5)

References :-

1. Principles and Procedures of Plant Protection –S.B. Chattopadhyay.
2. A Hand book of Plant Protection - D. Seshagiri Rao.
3. Chemistry of Insecticides and Fungicides – U.S. Sreeramulu.
4. Plant Protection - Mukundan -
5. Systemic Fungicide - S.C. Was
6. Fungicides by- Nene & Thapliyal.
7. Fungi and Plant diseases –B.B. Mundkur.
8. Text book of Modern Plant Pathology - K.S. Bilgrami and H.C. Dube.
9. Plant diseases - R.S. Singh.
10. Essentials of Plant Pathology – V.N. Pathak.
11. Plant Pathology –R.S. Mehrotra.
12. Introduction to principle of Plant Pathology- R.S. Singh.
13. Plant Pathology – Agrios.
14. Principles of Plant breeding – H.K. Choudhary.
15. Weed Science – Thakur.
16. Modern Weed Science – O.F. Gupta & P.S. Lamba.
17. Principles of Weed Science - V.S.Rao.
18. Manual of Weed Science – N.C. Joshi.
19. Elements of Economic entomology– Vasantraj Devid and T. Kumar swami.
20. Agricultural Pests of India and South East Asia – A.S. Atwal.
21. General and applied Entomology – K.E. Nayar, B. V. David.
22. Crop protection recommendations published by Department of Agriculture M.S.Pune

23. .Plant protection recommendations for Horticulture crops-Directorate of Horticulture M. S. Pune –411005.
24. Crop production and field experiments- Vaidya , Sahastrabudhe and Khuspe.
25. Plant diseases in India- G. Rangaswami.
26. Diseases of cereals and millets – T.S. Ramkrishna.
27. Principles of Plant disease control- S.A. J. Tarr,1971.
28. Scientific principles of crop protection – Mortin, Hubert & David Woodcock – Edward Ashold USA.
29. Entomogrow nematodes- Ficheer G. O. Jr.
30. Applied plant Biotechnology – Rao, Dr. S. Ignacimlie, Tak Maegrere.
31. Advances in Mycology & Plant Pathology – R. Chaudhari
32. Text book of Fungi O.P. Sharma – Tata McGraw
33. Elements of Economic Entomology-David & Kumar Swami.
34. Text book of toxicology – Shrivastava.
35. Toxicology of Insecticides – Matsmura.
36. Plant orgin insecticides.
37. Recent Advances in Host Plant Resistance –S. S. Dhahiliwal
38. Introduction to In Pest management – G.S. Ahaliwal.
39. Emerging trends in Biological control – T.N. Ananthakrisham.

PATIL AP/ JC BIRJE SR/ JC

B.Sc. III – Plant Protection (IDS) Old

Sr.No.	Paper Number	Marks
1	Paper- V (BOTANY)	100
2	Paper -VI (BOTANY)	100
3	Paper –VI (PP)	100
4	Paper -VIII (PP)	100
5	Practical- I (BOTANY)	50
6	Practical- II (BOTANY)	50
7	Practical -III (PP)	50
8	Practical IV (PP)	50
9	**Total**	**600**

B.Sc. III – Plant Protection (IDS) Revised

Sr.No.	Paper Number	Marks
1	Paper- V (BOTANY)	100
2	Paper -VI (BOTANY)	100
3	Paper –VI (PP)	100
4	Paper -VIII (PP)	100
5	Practical- I (BOTANY)	50
6	Practical- II (BOTANY)	50
7	Practical -III (PP)	50
8	Practical IV (PP)	50
9	**Total**	**600**

B.Sc. III – Seed Technology (Vocational) Old

Sr.No.	Paper Number	Marks
1	Paper- V (BOTANY)	100
2	Paper -VI (BOTANY)	100
3	Paper –VI (ST)	100
4	Paper -VIII (ST)	100
5	Practical- I (BOTANY)	50
6	Practical- II (BOTANY)	50
7	Practical -III (ST)	50
8	Practical IV (ST)	50
9	**Total**	**600**

B.Sc. III – Seed Technology (Vocational) Revised

Sr.No.	Paper Number	Marks
1	Paper- V (BOTANY)	100
2	Paper -VI (BOTANY)	100
3	Paper –VI (ST)	100
4	Paper -VIII (ST)	100
5	Practical- I (BOTANY)	50
6	Practical- II (BOTANY)	50
7	Practical -III (ST)	50
8	Practical IV (ST)	50
9	**Total**	**600**