

# **Swami Ramanand Teerth Marathwada University, Nanded**



**B. O. S. IN CHEMISTRY**

**B. Sc. Second Year  
(Agrochemicals and Fertilizers)**

**SEMESTER-III & IV**

**IN FORCE FROM JUNE - 2014**

## B.Sc. Second year –III rd semester

Paper	Course No.	Course	Periods /Week	Total periods	Total Marks
VI	CH-AG-201	Plant Nutrition and Fertilizers	3	45	50
VII	CH-AG_202	Insecticides and Herbicides	3	45	50

**B.Sc. Second year**

## –IV th semester

Paper	Course No	Course	Periods /Week	Total periods	Marks
VIII	CH-AG-203	Manures and Organic farming	3	45	50
IX	CH-AG-204	Plant Diseases and fungicides	3	45	50
X	CH-AG-205	Laboratory course-4	4	120	50
XI	CH-AG-206	Laboratory course-4	4	120	50

**B. Sc. Second Year  
Agrochemicals and Fertilizers  
Semester -III  
PAPER-VI  
PLANT NUTRITION AND FERTILIZERS**

**Periods: 45**

**Marks: 50**

**UNIT- I**

**1 Plant Nutrition: 08**

Essential plant Nutrients  
Functions and deficiency Symptoms of the essential Nutrients.  
Forms in which Nutrients are utilized by crop plants.  
How plants absorb nutrients  
Sources of plant Nutrients

**2 Nitrogenous Fertilizers: 08**

Introduction  
Classification  
General Characteristics.  
Manufacturing process and Properties of Ammonium Sulphate, Urea & Ammonium nitrate

**Unit-II**

**3 Phosphatic Fertilizers: 08**

Introduction  
Classification  
Manufacturing Process and Properties of Super Phosphate.  
Rock Phosphates.

<b>4</b>	<b>Potassic Fertilizers.</b>	<b>06</b>
	Introduction.	
	Classification.	
	Manufacturing process and properties of muriate of potash and Sulphate of potash.	
	Potash Minerals.	
	<b>Unit III</b>	
<b>5.</b>	<b>Complex Fertilizers</b>	<b>06</b>
	Introduction.	
	Advantages	
	Manufacturing process and properties of	
	Nitro phosphate	
	Ammonium phosphate.	
	<b>Unit IV</b>	
<b>6</b>	<b>Mixed Fertilizers.</b>	<b>08</b>
	Introduction.	
	Advantages and Disadvantages.	
	Materials used in mixed Fertilizers.	
	Method of Preparation.	
	Granulated Fertilizer mixtures	
<b>7</b>	<b>Micro Nutrient Carriers.</b>	<b>07</b>
	Introduction.	
	Micro Nutrient Fertilizers.	
	Soil Conditions Conducive to Micro Nutrient deficiency. Methods of Application	

**PAPER-VII**  
**Insecticides and Herbicides**

**Periods: 45**

**Marks: 50**

**Unit-I**

- 1 Insecticides** **12**
- Introduction and Definition.
  - Losses Caused by insects
  - Classification of Insecticides
  - Insecticidal formulations.
  - Natural Insecticides: Pyrethroids and Neem based
  - Principals and Methods of Insect Control
  - Physical and mechanical control.
  - Cultural Control.
  - Biological Control.
  - Chemical Control.
  - Legal or legislative Control.

**Unit-II** **12**

- 2 Synthetic insecticides and Integrated pest management**
- Organo chlorine Insecticides.
  - Organo Phosphorus Insecticides.
  - Carbamates & Sulphur Containing Compounds.
  - Synthetic Pyrethroids.
  - Fumigants.
  - Control of stored grain pests.
  - Integrated Pest Management.

**Unit -III**

- 3. Weeds and their Control** **09**
- Introduction:- Definition and Characteristics of weeds.
  - Damage Caused by weeds.
  - Classification of weeds.
  - Weed Control methods.
  - Mechanical.
  - Cultural.
  - Chemical.
  - Biological.

**Unit-IV**

- 4. Herbicides:** **09**
- Definition and Classification.
  - Some important Herbicides: 2,4-D, 2,4-5-T, simazine, atrazine, TCA, monuron
  - Dalapon, Glyphoset, (Structure, Chemical Names, Common Names and uses of above herbicides are expected)
  - Precautions in Storage and handling of herbicides.

**Semester IV**  
**PAPER-VIII**  
**MANURES AND ORGANIC FARMING**

**Periods: 45**

**Marks: 50**

**Unit –I**

**1. Bulky organic Manures. 08**

Farm yard Manures: Introduction, composition, losses during handling and storage and improved methods of preparation.

Compost: - Definition, composition, classification, methods of preparation.

Green Manuring:- Introduction, advantages and disadvantages, Green Manuring in situ, Green Leaf Manuring.

**2. Concentrated organic Manures: 04**

Oilcakes

Blood meal

Meat Meal

Fish Manure

Bone meal

**Unit-II**

**3. Time and Methods of Fertilizer applications. 05**

Principles governing selection of proper time and correct method of application,

Different Methods of Fertilizer applications.

Fertigation

Liquid Fertilizers.

**4 Balanced and Profitable use of Fertilizers. 05**

Principles of balanced Fertilization.

Profitable use of Fertilizers.

Factors affecting optimum use.

Economics of Fertilizer Use.

**Unit-III**

**5 Biofertilizers. 10**

Introduction

Classification

Importance in Agriculture.

Study of Rhizobium, Azotobacter, BGA and Azolla biofertilizers.

**Unit-IV**

**6. Concepts of organic farming and sustainable agriculture 06**

Definition, need, principals and steps to successful organic farming

**7. Sustainable agriculture 04**

Definition, difference between modern and sustainable agriculture,

advantages and disadvantages, management practices for sustainable agriculture

**8. Vermicompost 03**

Introduction , materials for preparation of vermicompost ,

production methodology, advantages of vermicompost



PAPER IX  
**Plant diseases and fungicides**

**Periods: 45**

**Marks: 50**

**Unit-I**

**1.1**

**Unit I**

**1 Diseases of Crops**

**18**

Introduction: Definition, Nature, causes of Plant diseases.

Reproduction and Dissemination

Types of Diseases

Seed borne diseases.

Soil borne diseases.

Air borne diseases.

Study of major diseases of following crops in Maharashtra state with reference to causal organism, symptoms, and control measures crops: sorghum, wheat, paddy, sunflower, groundnut, cotton, Sugar cane, bajra, Pigeon pea, citrus, mango, Banana, chillies, Brinjal.

**Unit II**

**2 Fungicides**

**18**

Introduction and definition.

Classification of Fungicides.

Formulation methods

Sulphur Fungicides.

Copper Fungicides

Mercury Fungicides

Systemic Fungicides

Antibiotics

Precautions taken during handling and storage of Fungicides.

Plant Protection equipments, their proper use and maintenance.

**Unit-III**

**3 Methods of application of fungicides**

**03**

Seed treatment.

Soil treatment.

Soil drenching.

Broad Cast

Fumigation

Furrow application.

Spraying.

Dusting

**Unit-IV**

**4 Agrochemicals and pollution**

**06**

Introduction & definition.

Types of Pollution.

Pollution due to use of Agrochemicals.

Pesticides/Insecticides

Herbicides

Fungicides

Pesticide residues in the water system and soil.

**Reference Books:**

1. Manures and Fertilizers By. K.S. Yawalkar J.P. Agarwal, S. Bokde
2. Soil Fertility and Fertilizers by S.L Tisdale , Nelson W.L.
3. Commercial Fertilizers By Collings.
4. Hand Book of Fertilizer Technology by Fertilizer Association of India.
5. Chemistry of Manures and Fertilizers by Mannickam and Mariakulandai
6. Biofertilizers by Soani L. L. Bhandari S.C. Sxena S.N.
7. Biofertilizers by Subba Rao.
8. Hand Book of Agriculture ICAR New Delhi.
  
9. Manures and Fertilizers by - FAI
  
10. Analytical Agril. Chemistry by Chopra and Kanwar.
  
11. Hand Book of Manures and Fertilizers by ICAR New Delhi.
1. Hand Book of Agriculture- ICAR
2. Diseases of crop plants in India- Rangaswami.
3. Environmental chemistry- A.K.De
4. Crop Production and Field experimentation Vaidhya, Khuspe, Sahasra Budhe.
5. Fungicides in plant disease control- Y.L. Nene, P.N. Thapliyal
6. Plant pathology- R.S. Sing.
7. Plant Pathology- Mehrotra.
8. Weed Science- Gupta.
9. Modern plant pathology-S.C. Dube.
10. Chemistry of Insecticides and Fungicides-U.S. Sree Ramula.
11. Methods of Pesticide analysis-U.S. Sree Ramulu.
12. Analytical Agricultural chemistry- Chopra and Kanwar.
13. Chemistry of Herbicides- Homer.
14. Hand book of Agrochemicals- Royal Society(UK)
15. Text book of Applied Entomology- K.P. Shrivastava
16. Modern Entomology by Dr. DB. Tambhare.
17. General and Applied Entomology- Anant Krishnan Nayar.



**B. Sc. Second Year  
Agrochemicals and Fertilizers  
Laboratory Course II  
Paper-X**

**Periods: 120**

**Marks-50**

(Note: At least 16 practical's are essential)  
(Each practical is of 4 periods)

1. Identification of different Manures and Fertilizers.
2. Estimation of Moisture and mineral matter from organic Manures (FYM/Compost/Oil Cake).
3. Estimation of organic carbon from FYM or Compost (Walkley and Black Method)
4. Estimation of Total nitrogen from FYM/Compost by Micro Kjeldhal's Method)
5. Determination of Acidity (in terms of H<sub>2</sub>SO<sub>4</sub>) of ammonium Sulphate.
6. Determination of purity percentage of ammonium sulphate.
7. Estimation of water soluble phosphate from super phosphate.
8. Determination of water soluble Calcium from super Phosphate.
9. Estimation of available zinc from Fertilizer sample.
10. Estimation of Manganese from Micro Nutrient carrier
11. Estimation of molybdenum from Micro Nutrient Carrier.
12. Qualitative test for N-P-K Fertilizer
13. Determination of Sulphate from Super Phosphate.
14. Estimation of Available NPK by using Soil testing Kit.
15. Study of Different types of Biofertilizers.
16. Estimation of Copper from Micro Nutrient Carrier.
17. Estimation of Nitrogen from urea.
18. Preparation and use of soil testing kit.
19. Visit to Manure Pit and Bio gas Plant.
20. Visit to Fertilizer Industry and study of their activities.
21. Visit to Fertilizer Testing Laboratory.
22. Estimation of Potassium in Fertilizers by flame photometer.
23. Determination of oil from oilcakes
24. Analysis of rock phosphate
25. Analysis of Ammonium phosphate
26. Analysis of Potassic fertilizers.

**B.Sc. Second Year  
Laboratory Course-III  
Agrochemicals and Fertilizers  
(Paper-XI)**

**Periods: 120**

**Marks: 50**

(At least 16 Practical Essential )  
(Each practical is of 4 periods)

1. Estimation of Copper pesticides by iodometric methods.
2. Estimation of zinc from zinc containing fungicides by EDTA method.
3. Estimation of chlorine from Dichlorophenyl Trichloro ethane (DDT)
4. Estimation of Sulphur from sulphur containing Fungicide.
5. Estimation of hydrolysable chlorine from BHC
6. Determination of moisture content from pesticides/fungicides
7. Estimation of mercury from mercury containing fungicide
8. Determination of percentage purity of zinc fungicide in commercial sample
9. Determination of dissolved carbon dioxide from water sample.
10. Determination of gamma isomer of BHC by column chromatography
11. Determination of chemical oxygen demand (COD) from water sample.
12. Gravimetric determination of zinc as Pyrophosphate from zinc containing fungicide.
13. Collection and identification of plant diseases.
14. Collection and identification of weeds.
15. Collection and identification of insects/pests.
16. Visit to the Agrochemicals Industry.
17. Study and market survey of different agricultural chemicals.
18. Study of Plant protection appliances.
19. Preparation and use of Bordeaux mixture.
20. Determination of percentage purity of phosphomidon from commercial sample.
21. Study and application of herbicides (demonstration).
22. Extraction of pesticide/fungicide from plant material.
23. Determination of PH/acidity/alkalinity of the formulation.
24. Isolation of microorganisms/ soil pathogens by culture.
25. Estimation of Fe<sup>2+</sup> from FeSO<sub>4</sub> from micro nutrient carrier.
26. Analysis of Bordeaux mixture
27. Estimation of hardness of water
28. Estimation of phosphorus from given sample of organo phosphorus insecticide.