Dr. Babasaheb Ambedkar Marathwada University,

Chhatrapati Sambhajinagar- 431004 (MS) India

Undergraduate Bachelor Degree Program in Science (B.Sc.)

Agrochemicals & Fertilizers

Course Structure and Curriculum (Outcome based Curriculum)

Choice Based Credit System

(Effective from Academic Year 2024-25)

Dr. M. A. Sakhare
Chairman
Ad-hoc Board in Agrochemicals & Fertilizers and Horticulture
Dr.Babasaheb Ambedkar Marathwada University, Chha.Sambhajinagar

1. Preamble:

Our University has successfully tried to meet the regional demands of Agro-economic development by introducing need based course. The course is ideally accomplished by having chemical analysis, analytical techniques, use and formulations of agrochemicals, pest management, fertilizer management, disease management, modern techniques of agriculture productivity and its preservation. Today there is a great demand for this course, as student have realized that it has better chance of getting jobs in agro industries, chemical industries, food industries and self-business like nursery, sericulture, floriculture, apiculture, dairy business, fishery, agriculture shop etc. while conventional courses only trend human resources for teaching.

With the advancement in agricultural practices and application of Modern techniques in order to increase agricultural productivity in the country, it is inevitable to use modern techniques for crop cultivation i.e. shed net, poly house and green house technology. In future is also needs to increase such type of agricultural technologies to produce more cultivation of crops in minimum quantity of water and Land. Ratio of rainfall is low due to which such techniques are increasing very fast and changing the atmosphere of Marathwada region. To provide skilled man power to this field the present course will be highly effective and this will help to fulfill the employment needs in above mentioned techniques.

The systematic and planed curriculum from first to final semester shall motivate the student for pursuing higher studies in agrochemicals and fertilizers and inculcate enough skill for becoming an entrepreneur.

Objectives:

1. To develop skill of modern agriculture techniques.
2. To provide knowledge regarding to organic manures and fertilizers, soil fertility management, Fertilizer management.
3. To provide knowledge related to nursery, sericulture, apiculture, dairy science, fishery etc.
4. To gives information about modern irrigation techniques i.e. micro irrigation, sprinklers irrigation, water conservation etc.
5. It aims at providing knowledge about advanced techniques of soil less culture i.e. hydroponics technology.
6. To improve knowledge about post-harvest technology aims at storing and preserving the fruits and vegetables for avoiding losses and improves profitability of farming.

2. Course Structure

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Aurangabad

Choice Based Credit System (CBCS) Curriculum For
Faculty of Science and Technology

Course Structure and Scheme of Examination

B.Sc. Three Year Undergraduate Degree Program

Semester V

	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSC-1D) **Core Courses**	ACF -511	Organic Manures (Theory Paper-IX)	45(3/week)	2	50	10	40	20
	ACF -512	Fertilizers (Theory Paper-X)	45(3/week)	2	50	10	40	20
	ACF -521	Lab course 7 (based on ACF-511)	45(3/week)	1.5	50	10	40	20
	ACF -522	Lab course 8 (based on ACF-512)	45(3/week)	1.5	50	10	40	20
Skill Enhancement Course (SEC-2)	ACF -513	SEC-3 Any one skill to be chosen out of two SEC-3(E): Organic Farming SEC-3(F): Beverage technology	45(3/week)	2	50	10	40	20
			225	9	250	50	200	100

Total Credits for Semester V : 09 (Theory : 06 ; Laboratory : 03)

Semester VI								
	Course Code	**Course Title**	**Total periods (Teaching periods/week)**	**Credits**	**Scheme of Examination**			
					Max Marks	**CIA**	**UA**	**Min Marks**
Optional I (DSC-1D) **Core Courses**	ACF -611	Plant nutrition and fruit preservation (Theory Paper-XI)	45(3/week)	2	50	10	40	20
	ACF -612	Agriculture technology (Theory Paper-XII)	45(3/week)	2	50	10	40	20
	ACF -621	Lab course 9 (based on ACF-611)	45(3/week)	1.5	50	10	40	20
	ACF -622	Lab course 10 (based on ACF-612)	45(3/week)	1.5	50	10	40	20
Skill Enhancement Course **(SEC-2)**	ACF -613	SEC-4 Any one skill to be chosen out of two SEC-4(G): Hydroponics SEC-4(H): Agriculture Biology	45(3/week)	2	50	10	40	20
			225	9	250	50	200	100
Total Credits for Semester VI : 09 (Theory : 06 ; Laboratory : 03)								
Total Credits for three years : Sem I (11.5) + Sem II (11.5) + Sem III (15) + Sem IV (15) + Sem V (09) + Sem VI (09) = 71 Credits								

3. Vision:

To impart the experiential learning through promoting skills, knowledge in the field of agrochemicals, Organic Manures, fertilizers, crop production, plant protection etc.

4. Mission:

1. To provide relevant education to the students in organic manures and fertilizers, soil fertility, agrochemicals and fertilizers.
2. To make the students well aware about the different agrochemicals and their management.
3. To encourage the young ones by imparting the knowledge in the organic manures, fertilizers and their management.
4. To persuade the youths on entrepreneurship in agriculture and rural development through adopting different ventures.

5. Programme Educational objectives:

1. Analytical techniques for agrochemicals.
2. Study of various organic manures and fertilizers.
3. Chemistry of fertilizers and their application.
4. To familiarize with recent modern agriculture technology development.
5. To help student to build up progressive and successful career in agriculture.
6. To train the student in skills related to agro industries.

6. Programme outcomes and Programme specific outcomes:

- Student develops a strong foundation in the fundamental concepts of agriculture.
- Students can work skillfully in agriculture industry.
- Students can employ the differential methods in crop cultivation.
- Students can have enough knowledge to pursue further study.
- Students will able to get exposed to strong theoretical and practical background in fundamental concepts of agro chemistry.
- To make them able to express ideas persuasively in written and oral form to develop their business abilities.
- Gained the theoretical as well as practical knowledge of handling agro chemicals

Eligibility:

1. He / She must have passed the higher secondary (multipurpose) examination conducted by H.S.C. board government of Maharashtra with science / technical subjects or an examination of any statutory university and board recognized as equivalent thereto.
2. Or he /She must have passed examination prescribed at the end of second year of the junior college conducted by the H.S.C. board, Government of Maharashtra with English, Second language, Physics, Chemistry, Mathematics and or Biology or one of the technical subjects prescribed at the said examination as the optional or elective subjects or an examination recognized as equivalent thereto.
3. He / She must have passed at qualifying examination. A candidates who has passed the B.Sc. examination of this university may be allowed to present himself subsequently at the degree examination in a subject or subjects other than those he has taken earlier provided that he puts in three years of attendance as a regular candidate for First, Second, Third year in the subject or subjects concerned excluding compulsory English, Second language and remaining optional subject(s). A candidate shall not be allowed to appear for such examination if he has passed the higher examination.

8. Duration:

The undergraduate program in agrochemicals and fertilizers is offered though the courses, Designed for granting the following B.Sc. degree. The course is of 3 years duration divided in 6 semesters.

9. Medium of instructions:

The medium of instruction for this course is in English.

10. Choice based credit system (CBCS) and credit to contact hour mapping:

Each theory paper and practical paper allotted 45 periods. Each theory paper having 2 credits and practical paper having 1.5 credits.

11. Attendance:

The student should need minimum 80 % attendance to appear the examination.

12. Evaluation Methods/ Scheme of Examination, Earning Credits, Grading system

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Question Paper Pattern

Nature of Question Paper (Theory) for choice- based credit system (CBCS) semester Pattern

Subject: Agrochemicals & Fertilizers

Time: 2 Hours Max.Marks:40

Instructions:

1) *All questions are compulsory.*
2) *All question carry equal marks*
3) *Fig to the right indicate full marks*

Q.1. Long answer questions (Solve any one) 10
- A. Question from Unit-I
- B. Question from Unit-III

Q.2. Long answer questions (Solve any one) 10
- A. Question from Unit-II
- B. Question from Unit-IV

Q.3. Write notes on (attempt any two) 10
- A. Short answer question from Unit-I
- B. Short answer question from Unit-II
- C. Short answer question from Unit-III
- D. Short answer question from Unit-IV

Q.4. Multiple choice questions (MCQ) 10

Note: Ten MCQ's having four alternatives based on theory.
(Minimum two MCQ's from each unit)

Note: Continuous Internal Assessment (CIA): Theory = 10 marks

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Scheme of practical examination and marks (Practical) for choice based credit system (CBCS) semester pattern

B.Sc. III Year Semester-V (**ACF-521, ACF-522**) and Semester-VI (**ACF-621, ACF-622**)

Subject: Agrochemicals & Fertilizers

i. **Continuous Internal Assessment (CIA): Practical** (10 marks): 05 marks for internal practical examination and 05 marks for record book.

ii. **Practical Examination:** Annual examination

Continuous Internal Assessment (CIA): for 40 marks distribution

Course Title	Internal Practical Examination Marks	Record Book Marks	Total Marks
ACF-521	05	05	10
ACF-522	05	05	10
ACF-621	05	05	10
ACF-622	05	05	10
Total	**20**	**20**	**40**

Practical Examination (UA)

1. Experimental performance ACF-521 +ACF-621 = 70 + Viva voce + RR -10 = 80 Marks
2. Experimental performance ACF-522 +ACF-622 = 70 + Viva voce + RR -10 = 80 Marks

Important Notes:

i) **Nomenclature**: DSC- Discipline Specific Core course, SEC – Skill Enhancement Course, AECC- Ability Enhancement compulsory course, DSE- Discipline Specific Elective, UA- University Assessment (Semester End), CIA-Continuous Internal Assessment

ii) **There shall be one skill enhancement course (SEC) IIIrd to VIth Semester (any one SEC course to be chosen (any one from three optional subjects) from the basket of SEC courses for the respective semester.**

iii) **Code description**: XXX code has to be decided by BOS of the respective subject while designing their respective curriculum (e.g. for Physics it will be PHY; for Electronics it will be ELE)

- The codes for Fifth semester courses will start from CF-511 and sixth semester courses will start from ACF-611 and so on
- ACF-511 : The first digit indicate the Semester Number, the second two digits indicate paper numbers for the Fifth-semester courses and the same analogy is for the remaining semesters
- The codes for theory courses will start from ACF-511 (for the fifth semester and the same analogy is for the remaining semesters)
- The codes for practical courses will start from ACF-521 (for the fifth semester and the same analogy is for the remaining semesters)
- The codes for Ability Enhancement compulsory courses will start from ACF-513 (for the fifth semester and the same analogy is for the remaining semesters)

iv) **Assessment**: 80% for University Assessment (Semester End Examination) and 20 % for Continuous Internal Assessment (CIA)

v) **Continuous Internal Assessment (CIA): Theory** (10 Marks): Internal Test 05 Marks (Two Internal Tests of 05 marks each and average of the two test will be considered) and 05 Marks for Assignment/tutorials.

vi) **Continuous Internal Assessment (CIA): Practical** (10 Marks): 07 Marks for Internal Practical Examination and 03 Marks for record book/submission of collection and field survey report and excursion report

vii) **Practical examination** : Annual examination

B.Sc. V Semester
Core Course (Theory paper-IX)

Course Code: ACF-511

Title of course: Manures

Credit: 02 Marks: 50 Periods: 45

Learning Outcomes*:* On successful completion of this course student will be able to

* Understand the manure and its importance in soil fertility management.
* Get the knowledge of Green manure and its scope.
* Aware about gobar gas productivity.

Unit: I Introduction to Manures **10 Periods**

Definition, Scope of manures, Bulky and concentrated manures,

Introduction to farm yard manure, Preparation, Composition, applications and Importance

Improved methods of handling farm yard manure (F.Y.M.)

Unit: II Compost & Gobar Gas Technology **10 Periods**

Rural and Urban Compost Preparation, composition and application to field,

Construction of gobar Gobar gas plant, Chemistry of gobar gas production,

Importance and application of Gobar gas manure

Unit: III Green Manuring **10 Periods**

Introduction, Preparation, Importance and application of green manures,

Green manuring in situ and green leaf manuring

Unit: IV Oil Cakes **10 Periods**

Edible and non edible oil cakes: Preparation application to the field

Bone meal and Blood meal: Preparation application to the field.

Unit V: Tutorials, Seminars and Assignments **05 Periods**

Reference Book:

1. Soil fertility and fertilizer: Tisdle and Nelson
2. Manures and fertilizers Das P. C., Rept. 2015, Kalyani Publishers Pvt. Ltd., New Delhi
3. Soil Fertility Management Nagornny V. D. and Raghav J. S. Rept. 2015, Kalyani Publishers Pvt. Ltd., New Delhi
4. Soil Science: P. S. Varma and V. K. Agarwal.
5. Soil fertility: Theory and Practice by J. S. Kanwar

B.Sc. V Semester
Core Course (Theory paper-X)
Course code: ACF-512
Title of course: fertilizers

Credit: 02 Marks:50 Periods: 45

Learning Outcomes*:* On successful completion of this course student will be able to
* Understand the basic concepts of fertilizers and its importance.
* Identify the importance of fertilizers in crop cultivation.
* Understand the chemical nature of fertilizers.

Unit: I Nitrogenous Fertilizers **10 Periods**

Manufacture, properties, forms and Rate of application of following fertilizers

i. Urea ii. Ammonium Sulphate
iii. Ammonium nitrate

Unit: II Potassic & Phosphatic Fertilizers **10 Periods**

Manufacture, properties, forms and Rate of application of

i. Super Phosphate
ii. Rock Phosphate

Manufacture, properties, forms and Rate of application of

i. Muriate of potash (KCl)
ii. Sulphate of potash (K_2SO_4)

Unit: III Complex Fertilizers **10 Periods**

Manufacture, properties, forms and Rate of application of

i. Ammonium Phosphate ii. Nitro phosphate
iii. Suphala

Advantages of complex fertilizers

Unit: III Micronutrient carriers **10 Periods**

Manufacture, properties, forms and Rate of application of

i. Ferrous sulphate ii. Zinc sulphate
iii. Cupper sulphate iv. Ammonium moliblate
v. Manganese sulphate vi) Boro

Unit V: Tutorials, Seminars and Assignments **05 Periods**

Reference book:

1. Manures and fertilizers Das P. C., Rept. 2015, Kalyani Publishers Pvt. Ltd., New Delhi
2. Practical manual for Agril. Chemistry Gupta A. K. and Varshney M. L., Kalyani Publishers Pvt. Ltd., New Delhi
3. Soil Fertility Management Nagornny V. D. and Raghav J. S. Rept. 2015, Kalyani Publishers Pvt. Ltd., New Delhi.
4. Fertilizers: Properties, Application and Effect, R. Langdon, Elsworth, Paley, W.O. Nova Science Pub 2008.

B.Sc. V Semester
Core Course (Lab. Course 6)
Course Code: ACF-521

Credit: 1.5 Marks: 50 Periods: 45

1. Identification of different N, P and K fertilizers.
2. Identification of complex fertilizers and Micronutrient carriers
3. Qualitative test of urea and ammonium sulphate
4. Laboratory test of super phosphate and Rock phosphate
5. Qualitative test of micronutrient carriers
6. Laboratory test of sulphala and nitrophosphate
7. Determination of potassium from soil using soil kit.
8. To determine acidity of ammonium sulphate
9. Estimation of organic matter from compost
10. Estimation of available zinc from fertilizer
11. Visit to vermiculture unit.
12. Project Report.

B.Sc. V Semester
Core Course (Lab. Course 7)
Course Code: ACF-522

Credit: 1.5 | Marks: 50 | Periods: 45

1. Estimation of Nitrogen from manure.
2. Nitrogen determination from rural compost sample.
3. Identification of different oil cake samples (edible and non-edible oil cake)
4. Determination of moisture from cotton seed cake.
5. Determination of mineral matter from groundnut cake.
6. To determine Ash percentage from safflower cake.
7. Estimation of available nitrogen from urea.
8. Estimation of available phosphate from super phosphate.
9. Visit to soil testing laboratory.
10. Project Report

B. Sc. Third Year
(Semester-V)

Skill Enhancement Course (SEC-3)

Note:

Any one skill Enhancement Course to be chosen out of two either SEC-1(A): Pesticide Formulation or SEC-1(B): Biological insecticides.

B. Sc. Second Year Agrochemicals & Fertilizers
(Semester-V)
Course Code: SEC- 513
Title of the Course: SEC-3 (E) Organic Farming

Credit: 02 Marks: 50 Periods: 45

Unit: I Organic farming **10 periods**

Introduction, Concept, principles and its scope in India; Initiatives taken by Government (central/state), NGOs and other organizations for promotion of organic agriculture, benefits, Social and Market aspects of organic farming.

Unit: II Organic fertilizers Introduction, need, benefits, preparation of organic fertilizers, Demonstration and land preparation

Unit : III Use of microorganism in organic farming **10 periods**

Introduction, need of microorganism in soil fertility, benefits of microorganism in organic farming

Unit : IV Method of increasing soil fertility **10 periods**

Use of cow dung, FYM, Green manure, Crop rotation, Use of vermicompost and preparation of vermicomposting, Bio control and management of pathogens

Unit V: Tutorials, Seminars and Assignments **05 periods**

Reference books:

1. Principles of organic farming by S.R. Reddy
2. Manufacture of biofertilizer and organic farming by H.Panda
3. Organic fertilizer from basic concept to applied outcomes edited by Marcelo L. Larramendy
4. Basic organic farming by M. Bansal
5. Organic farming and Biofertilizers by Vijaykumar Sethi, Pavan kumar Bharathi

B. Sc. Second Year Agrochemicals & Fertilizers
(Semester-V)
Course Code: SEC- 513
Title of the Course: SEC-3 (F) Beverage technology

Credit: 02 Marks: 50 Periods: 45

Learning Objective:

At the completion of this course, the student should be-

* To provide knowledge of beverage technology
* To provide a technical view of beverages
* To provide a discussion of manufacturing processes of beverages

Unit- I : Types of beverages and their importance; status of beverage industry in India; Manufacturing technology for juice-based beverages; dry beverages; role of various ingredients of soft drinks, carbonation of soft drinks. Specialty beverages based on tea, coffee, cocoa, spices, plant extracts, herbs, nuts, dairy and imitation dairy-based beverages. **10 periods**

Unit- II : Alcoholic beverages- types, manufacture and quality evaluation; the role of yeast in beer and other alcoholic beverages, technology of brewing process, equipment's used for brewing and distillation, wine and related beverages, distilled spirits. **10 periods**

Unit- III : FSSAI specifications for beverages, Ingredients, manufacturing and packaging processes and equipment for different beverages; quality tests and control in beverages; Miscellaneous beverages Coconut water, sweet toddy, sugar cane juice, coconut milk, flavoured syrups. **10 periods**

Unit- IV : Water treatment and quality of process water Sweeteners, colorants, acidulants, clouding and clarifying and flavouring agents for beverages Carbon dioxide and carbonation. **10 periods**

Unit- V: Tutorials, Seminars and Assignments **05 periods**

Books Recommended:

1. Beverages: Processing and Technology by Deepak Mudgil & Sheweta Mudgil
2. Innovative Technologies in Beverage Processing by
3. Chemistry and Technology of Soft Drinks and Fruit Juices, 3rd Edition by Philip R. Ashurst
4. Beverages Technology by Umesh Kumar
5. Food and Beverage Service by John Cousins & Suzanne Weekes
6. Fermented Foods And Beverages Technology by Ravindra A., Srinivas Maloo, Fr. Dr. S. Emmanuel S. J.
7. The Complete Technology Book on Alcoholic and Non- Alcoholic Beverages (Fruit Juices, Whisky, Beer, Rum and Wine) by NPCS Board of Consultants & Engineers.

B. Sc. Second Year Agrochemicals & Fertilizers
(Semester-VI)

Course Code: ACF- 611

Title of the Course: DSE-1 B (1) Plant Nutrition and Fruit Preservation

Credit: 02 Marks: 50 Periods: 45

Learning Objective .

At the completion of this course, the student should be-

* To give the knowledge of hydroponics and plant nutrition.
* To know about preservation of fruits and vegetables.
* To know about eco-friendly pesticides.

Unit- I: Hydroponics & Plant Nutrition **10 periods**

Methods of soil-less cultivation, Nutrient film technique (NFT), Advantages and disadvantages of hydroponics Applications of hydroponics in agriculture. Introduction essential elements in plant Physiological role of essential elements in plant Deficiency symptoms of essential elements in plants.

Unit- II: Preservation, Canning and Bottling of Fruits and Vegetables **10 periods**

spoilage of fruits and vegetables importance and principles of preservation methods of preservation chemical preservatives -types and uses
Canned mango and canned vegetables.

Unit- III: Preparation of Fruit Beverages & Preparation of Jams, Jellies, ketchup **10 periods**

Preparation of fruit juices, squashes, cordial, Preparation of orange & lemon squash
Preparation of fruit jelly, apple jam, mango jam, amla jam, Mixed fruit jam.
Preparation of crystallized fruits: Preparation of amla Candy
Preparation of Tomato products: Tomato Ketchup and puree
Preparation & preservation of pickles: mango, lime, chillies and vegetable pickles

Unit- IV: Drying and Post-harvest technology of Fruits & Vegetables **10 periods**

Methods –sun drying, mechanical dehydration, drum drying
Preparation of raisins from grapes. Banana products like chips and powders
Harvesting, storage and marketing of fruits
Harvesting, grading, packaging, marketing and storage of vegetables

Unit- V: Tutorials, Seminars and Assignments **05 Periods**

Reference Book:

1. Fruit Physiology and Production- Amarsingh
2. Basic concept of fruit science –N.P.Singh
3. Fruits – Ranjeet Singh and Saxena
4. Vegetable science –Hazara and Som
5. Preservation of fruits and Vegetables -Girdharilal and Tondon
6. Foods and Nutrition – Sumati Mudambi

B. Sc. Second Year Agrochemicals & Fertilizers
(Semester-VI)

Course Code: DSE- 612

Title of the Course: DSE-1 B (2) Agricultural technology

Credit: 02 Marks: 50 Periods: 45

Learning Objective:

At the completion of this course, the student should be

* To give the knowledge of hydroponics and plant nutrition.
* To know about preservation of fruits and vegetables.
* To know about eco-friendly pesticides.

Unit-I: Problematic Soils **10 periods**

Introduction to saline and alkali soils, Classification, Diagnostic criteria and causes of their formation Adverse effects, Reclamation and management of saline and alkali soils Introduction to acidic Soils, Sources of soil acidity, Reclamation of acidic soils

Unit-II: Green House Technology & Micro- irrigation **10 periods**

Introduction, Components and design of greenhouses Advantages, Applications of greenhouses technology in agriculture

Micro- irrigation : Introduction, Drip and sprinkler irrigation systems, Their components Advantages. Their importance in water management

Unit-III: Floriculture, Fishery and Apiculture **10 periods**

Introduction, Methods of cultivation, Important flower crops of Maharashtra state, Handling, transportation and storage of floriculture products, Export potential in floriculture.

Fishery: Inland fishery, Culture fishery, Capture fishery

Apiculture: Honey bee culture, Bee keeping, Economic use of Honey and wax

Unit-IV: Soil and Water Conservation **10 periods**

Soil erosion- definition and types, Importance, Methods of soil and water management Waste land reclamation, Watershed management- definition and objectives Water harvesting- definition, methods of water harvesting.

Unit- V: Tutorials, Seminars and Assignments **05 Periods**

Reference Book:

1. Introduction to Agronomy –soil and water management.-Vaidhya and Sahasrabuddhe
2. Sprinkler Irrigation -WALMI Publication
3. Drip Irrigation -WALMI Publication.
4. Hand book of Agriculture -ICAR Publications
5. Principles of Agronomy- Reddy and Reddi

B. Sc. Second Year Agrochemicals & Fertilizers
(Semester-VI)
Core Course (Lab. Course 8)
Course Code: ACF-621

Credit: 02 Marks: 50 Periods: 45

Learning Objective:
At the completion of this course, the student should be
* To give the knowledge of hydroponics and plant nutrition.
* To know about preservation of fruits and vegetables.
* To know about eco-friendly pesticides

1. Determination of $_{P}H$ from soil sample
2. Determination of $_{P}H$ from water sample
3. Determine electrical conductivity of soil sample
4. Study of garden tools and implements
5. To determine total soluble salt from soil extract
6. Study and practice of grafting technique
7. Study and practice of budding technique
8. Visit to the fruit orchards /vegetable garden to study the package of practices
9. Preparation of fruit jam.
10. Preparation of fruit Jelly
11. Project Report.

B. Sc. Second Year Agrochemicals & Fertilizers
(Semester-VI)
Core Course (Lab. Course 9)
Course Code: ACF-622

Credit: 02 Marks: 50 Periods: 45

Learning Objective:
At the completion of this course, the student should be
* To give the knowledge of hydroponics and plant nutrition.
* To know about preservation of fruits and vegetables.
* To know about eco-friendly pesticides

1 Preparation of Lime Juice

2 Preparation of Lemon squash.

3 Study of drip irrigation components /field visit.

4 Study of sprinkler irrigation components /field visit

5 Estimation of Ascorbic acid from Lemon juice

6 Estimation of reducing sugar from Lime juice

7 Estimation of non reducing sugar from fruit juice

8 Visit to fishery unit and fish seed farm.

9 Visit to Apiculture unit

10 Visit to fruit preservation industry

11 Project Report

B. Sc. Third Year
(Semester-V)

Skill Enhancement Course (SEC-4)

Note:

Any one skill Enhancement Course to be chosen out of two either SEC-1(A): Pesticide Formulation or SEC-1(B): Biological insecticides.

B. Sc. Second Year Agrochemicals & Fertilizers
(Semester-V)
Course Code: SEC- 613
Title of the Course: SEC-4 (G) Hydroponics

Credit: 02 Marks: 50 Periods: 45

Learning Objective:

At the completion of this course, the student should be-

* To provide basic knowledge of Hydroponic systems.
* To provide a technical view of working with hydroponic equipments.
* To provide a knowledge of Nutrition management and Hydroponic crops.

Unit I Introduction to Soilless culture of plants **10 periods**

History and origin of Soilless culture, Present status of hydroponics-Contrasts with soil-based culture, Applications & Future developments

Unit II Plant Nutrition **10 periods**

Essential, mineral elements-Functions and effects on plants, Deficiency Symptoms of the following Essential Minerals-N, P, Ca, Mg, K, S, Fe, Mn, Cu, Zn, B, Mo. Environmental & Chemical Factors: Light, Temperature (heating & cooling), Humidity, & pH

Unit III: Nutrient Solutions and Media **10 periods**

Inorganic salts (fertilizers)-Macronutrients, Micronutrients, Formulating, monitoring, and analyzing, Plant Nutrition, pH adjustment, selecting fertilizers and nutrient monitoring; Media used for Hydroponics: Ex-clay, Rock wool, Coir, Perlite, Pumice, Vermiculite, Sand, Gravel, Brick shards, Polystyrene packing peanuts, wood fiber; Weed management, diseases and pest control, Pollination, making clones of plants.

Unit IV: Techniques in Hydroponics and Cultivation of crop plants **10 periods**

Techniques in Hydroponics – Static solution culture, Continuous – flow Solution culture, Aeroponics, Passive sub-irrigation, Ebb and flow or flood and drain irrigation, Deep water culture; Protocols for – Tomato cultivation through Dutch bucket method, Chilly cultivation through NFT system, Spinach through Raft system , Fodder system.

Unit- V: Tutorials, Seminars and Assignments **05 Periods**

Reference Book:

1. Keith Roberto. How to Hydroponics. The future garden press New York. 4th Edition.
2. Howard M. Resh. Hobby Hydroponics. CRC Press USA.
3. Prasad S and Kumar U. Green House Management for Horticultural Crops. Agrobios India
4. Dahama A K. Organic Farming for Sustainable Agriculture. Agrobios India.
5. Subbarao N.S. (1995). Biofertilizers in Agriculture and Forestry. Oxford and IBH publishing Company Pvt. LTd. New Delhi
6. B. A. Kratky. A Suspended Net-Pot, Non-Circulating Hydroponic Method for Commercial Production of Leafy, Romaine, and Semi-Head Lettuce. UH–CTAHR.

B. Sc. Second Year Agrochemicals & Fertilizers
(Semester-V)
Course Code: SEC- 613

Title of the Course: SEC-4 (H) Agriculture Biology

Credit: 02 Marks: 50 Periods: 45

Learning Objective:

At the completion of this course, the student should be-

* To impart basic knowledge and develop skills about propagating different types of plants by seed, cuttings, budding and grafting, separation, division, layering as well as micro-propagation.
* To study the Plant Propagation.
* To aware with the mechanism of Pest and Disease Management of Horticultural Crops.

Unit I: Introduction and importance of Gardening **10 periods**

Introduction and importance of Gardening, Soil types and preparation and treatment, Fertilizers, organic fertilizers and bio fertilizers Gardening, bonsai, Outdoor garden types and arrangements annuals, biennials. Perennials with common examples and culture: influence of environment, training (trimming), pruning and transplantation.

Unit II: Methods of plant propagation **10 periods**

layering, cutting, grafting, budding and their advantages. Pest and weed management – historical, theoretical, philosophical and biological insect pest suppression. Weed problem and ecological perspective, biological control of weeds, growth regulators, growth retarders, sex modification, flower induction, parthenocarpy, harvesting seed storage, preservation of fruits and vegetables.

Unit III: Bio fertilizers: **10 periods**

Importance of biofertilizers in agriculture (Rhizobium, Azatobacter, Mycorrhiza, Actinorhixa) advantages and current status. Vermiculture, Composting, current practices & production of biofertilizers. Nitrogen fixation-diazotrophic microorganisms, genetics of free living and symbiotic diazotrophs (N 2 fixation genes, transfer of nif genes to micro propagation). Blue green algae & Azolla-identification of elite species (strains) & mass products for practical application.

Unit IV: Bio pesticides: **10 periods**

Control of pests. Importance of Juvenile Hormone and JH analogues in insect pest control. Insect pheromones and their application. Biological control of pests & diseases of crop plants and weeds, biopesticide predators, parasites, insect virus, antagonistic fungi & bacteria, antifeedents and insecticidal activities of the compounds of botanicals.

Unit- V: Tutorials, Seminars and Assignments **05 Periods**

Reference Book:

1. A complete guide to gardens -Al David
2. Garden flowers - Vishnu Swarup
3. Complete library of gardens (3 volumes) Kissan world - Readers digest
4. Plant cell, tissue and organ culture, Narosa publication.- Reinert and Bajaj
5. Agricultural microbiology-G.Rangaswamy and D.J.Bhagyaraj.
6. Text book of environmental Science- Subramanian .V.