

**GOVERNMENT COLLEGE (AUTONOMOUS)**  
**RAJAMAHENDRAVARAM**  
(ESTD: 1853, NAAC Re-Accredited with Grade 'A+')

**Board Of Studies Meeting for U.G. Agriculture**

2022-2023



**DEPARTMENT OF BOTANY**

**Government College (Autonomous), Rajamahendravaram**  
**B.Sc. (Agriculture) Syllabus (w.e.f: 2021-22 A.Y)**

**DETAILS OF COURSES AND CREDITS**

Semester	Course Code	Title of the Course	Hrs.	Credits	IE	EE	Total
<b>FIRST YEAR</b>							
Sem.-I	Agri-1	Fundamentals of Soil Science and Soil Microbiology	4	4	50	50	100
		Practical - 1	2	1	-	50	50
Sem.-II	Agri-2	Principles of Agronomy	4	4	50	50	100
		Practical - 2	2	1	-	50	50
<b>SECOND YEAR</b>							
Sem.-III	Agri-3	Basics of Entomology	4	4	50	50	100
		Practical - 3	2	1	-	50	50
Sem.-IV	Agri-4	Principles of Plant Breeding	4	4	50	50	100
		Practical - 4	2	1	-	50	50
	Agri-5	Basic concepts of Plant Diseases and Pathology	4	4	50	50	100
		Practical - 5	2	1	-	50	50

**Structure of Skill Enhancement Courses for Semester – V**

*(To choose One pair from the Four alternate pairs of SECs)*

Course Code	Course NO. 6 & 7	Name of Course	Th. Hrs. / Week	IE Mar-ks	EE Mar-ks	Credits	Prac. Hrs./ Week	Mar-ks	Credits
AgriE1	6A	Organic Farming	3	50	50	3	3	50	2
AgriE2	7A	Agroforestry	3	50	50	3	3	50	2
OR									
AgriE3	6B	Integrated Pest and Disease Management	3	50	50	3	3	50	2
AgriE4	7B	Dryland Agriculture	3	50	50	3	3	50	2
OR									
AgriE5	6C	Weed management	3	50	50	3	3	50	2
AgriE6	7C	Water Management	3	50	50	3	3	50	2
OR									
AgriE7	6D	Soil Fertility and Nutrient Management	3	50	50	3	3	50	2
AgriE8	7D	Biopesticides and Biofertilizers	3	50	50	3	3	50	2

**Note:** For Semester–V, for the domain subject Agriculture, any one of the four pairs of SECs shall be chosen as courses 6 and 7, i.e., 6A & 7A or 6B & 7B or 6C & 7C or 6D & 7D. The pair shall not be broken (ABCD allotment is random, not on any priority basis).

**Agri-1**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**  
**I B.Sc., - SEMESTER- I: Agriculture Core Course – 1 Syllabus**  
(w.e.f 2021-22 admitted batch)

**Fundamentals of Soil Science and Soil Microbiology**

(Total hours of teaching – 60 @ 04 Hrs./Week)

**Theory:**

**Learning Outcomes:** On successful completion of this course, the students will be able to :

- Develop a critical understanding of soil biota.
- Explain the role of microbes in mineralization of nutrients for plants.
- Realize the operation of various biogeochemical cycles in nature.
- Explain the formation of soil organic matter due to the activities of soil microbes.
- Realize the interaction among soil biota and between microbes – plants.

**Unit -I: Soil as a living medium**

**10 Hrs.**

1. Soil - definition and composition; soil structure and characteristic features.
2. Role of humus and clay in ion exchange and nutrient availability.
3. Soil as a habitat for microorganisms; soil microbes – algae, bacteria, actinomycetes, fungi, protozoa and nematodes.
4. Microbial balance in soil; molecular markers for ecological studies of soil microorganisms.

**Unit II: Microbes in rhizosphere**

**14 Hrs.**

1. Rhizosphere and rhizo-plane microorganisms; reasons for increased microbial activity in rhizosphere.
2. Composition of root exudates factors affecting exudation, rhizosphere microorganisms, rhizosphere effect.
3. Factors affecting microbial community in soil-soil moisture, organic and inorganic chemicals.
4. Nitrogen cycle: microbiology and biochemistry of Ammonification, nitrification and denitrification, utilization of various nitrogen sources.
5. Nitrogen fixation, diversity of diazotrophs, associative and symbiotic Nitrogen fixation. Mechanism of nodulation and nitrogen fixation, role of various genes in these processes.

**Unit III: Microbial transformation of minerals**

**14 Hrs.**

1. Microbial transformation of Phosphorus—Phosphorus cycle.
2. Source of organic and inorganic phosphates in soil and elsewhere, mineralization of inorganic phosphates; factors affecting phosphate solubilization and mechanism.
3. Microbial transformation of sulphur- Sulphur cycle; source of Sulphur, Sulphur oxidizing and reducing microorganisms (*Thiobacillus* and *Desulfovibrio*), biochemistry of transformation. Sulphate and Sulphur reduction, H<sub>2</sub>S formation.
4. Role of *Thiobacillus* in agriculture and soil reclamation.
5. Microbial transformation of Iron, Manganese, Zinc, Copper and Potassium

**Unit – 4: Soil organic matter**

**12 Hrs.**

1. Soil organic matter. Organic matter decomposition; Organic matter dynamics in soil.
2. Microbial decomposition of cellulose, hemi cellulose and lignin.
3. Factors affecting organic matter decomposition (litter quality, temperature, aeration, soil pH, inorganic chemicals, moisture).

4. Pesticide degradation in soil, effects of pesticides on soil microflora, soil microbial biomass as an index of soil fertility.

**Unit –V: Interactions among soil microbes**

**10 Hrs.**

1. Microbial interactions; negative interactions. Ammensalism, competition, parasitism and predation (mycoparasitism, mycophagy, nematophagy – predaceous fungi),
2. Commensalism positive interactions – mutualism, synergism.
3. Associative symbiosis - cyanobacterial, bacterial (*Rhizobium* legume symbiosis), actinomycetes (actinorrhiza –*Frankia* non root legume symbiosis) and fungal symbiosis – types and significance of mycorrhiza.
4. Concept of beneficial microorganisms.

**Books for Reference:**

- **Subba Rao, N.S., 2017.** Soil Microbiology, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
- **Subba Rao, N.S., 1995.** Soil Microorganisms and Plant Growth, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
- **Martin Alexander, 1986.** An introduction to Soil Microbiology, Wiley, New Jersey.
- **Paul, E.A., 2007.** Soil microbiology Ecology and Biochemistry, Academic press, Cambridge.

**Suggested co-curricular activities for Agriculture Core Course -1 in Semester-I:**

**A. Measurable:**

**a. Student seminars:**

1. Soil atmosphere and water.
2. Soil pH and temperature.
3. Rhizosphere as a habitat.
4. Organic matter decomposition and humification.
5. Types of mycorrhizae.
6. Acquisition and transport of nutrients in mycorrhizae.
7. Soil fauna.
8. Soil profile.
9. Soil microorganisms and carbon cycle.
10. Classification of soil types.

**b. Student Study Projects:**

1. A report on composition of different soil samples.
2. A study report on microbes from a soil sample.
3. Determination of water, pH and temperature of different soil samples.
4. Microbes on phylloplane of a crop plant.
5. Microbes from rhizosphere of a crop plant.
6. Isolation and identification of cellulolytic microbes from soil sample of a crop field.
7. Isolation and characteristics of *Rhizobium* from some leguminous plants.
8. Study report on microbes from spermosphere of some crop plants.

**c. Assignments:** Written assignment at home / during '0' hour at college; preparation of charts with drawings, making models etc., on topics included in syllabus.

**B. General:**

1. Group Discussion (GD)/ Quiz/ Just A Minute (JAM) on different modules in Syllabus of the course.
2. Visit to soil science and microbiology laboratories in Agriculture / Horticulture University/ Research station

**Agri-1**  
**GOVERNMENT COLLEGE (A), RAJAMAHENDRAVARAM**  
**I year B.Sc., Program Examinations at I Semester /Agriculture Core Course - 1**  
**Fundamentals of Soil Science and Soil Microbiology**  
**Model Question Paper (w.e.f. 2021-22)**

**Time: 2 ½ Hrs.**

**Max. Marks: 50**

**Section – A**

**5 x 4 = 20M**

**Answer any Five of the following questions. Draw diagrams wherever necessary.**

1. Soil Profile
2. Composition of Earth Crust
3. Anion Exchange Capacity (AEC) and its importance.
4. Decomposition of soil organic matter
5. Soil reclamation
6. Sulphur cycle
7. R/S ratio
8. Mutualism

**Section – B**

**3 x 10 = 30M**

**Answer any Three of the following questions. Draw neat and labeled diagrams wherever necessary.**

9. Write an essay on soil structure and factors influencing the genesis of soil structure.
10. Define Soil pH? Explain factors affecting on soil pH.
11. Write an account on Phosphate solubilizing microbes and their role in phosphorus cycle
12. Give an account on Composition of root exudates and factors affecting root exudation.
13. Describe the Concept of beneficial microorganisms.
14. Explain briefly about nutrient management concept.

**BLUE PRINT of QUESTION PAPER**

Unit no. / Title	SAQ	LAQ	Marks allotted to the Module
Unit- 1 / Basic concepts of pedology	2	1	18
Unit- 2 / Physico-chemical properties of soil	2	1	18
Unit – 3/ Biogeochemical cycles	2	1	18
Unit- 4 / Concepts of Edaphology	1	2	24
Unit– 5 / Interactions among soil microbes	1	1	14
<b>Total marks allotted to all questions including choice =</b>	<b>08</b>	<b>06</b>	<b>92</b>

**Note:** Question paper setters are requested to adhere strictly to the above blue print while preparing the said paper.

**Practical syllabus of Agriculture Core Course – 1/ Semester – I**  
**Fundamentals of Soil Science and Soil Microbiology**  
(Total hours of laboratory exercises 30 Hrs. @ 02 Hrs./Week)

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**Course Outcomes:** On successful completion of this course, the students shall be able to :

- Perform various tests on physico-chemical parameters of soil.
- Isolate and culture various soil microbes in the laboratory.
- Determine the organic matter in a given soil sample.

**Exercises:**

1. Study of soil composition and structure.
2. Isolation of bacteria from a soil sample using serial dilution or streaking method and culture.
3. Demonstration of Gram staining technique.
4. Isolation and culture of Cyanobacteria from a soil sample.
5. Isolation of and culture of algae from a soil sample.
6. Isolation and culture of Actinomycetes from a soil sample.
7. Identification of *Rhizobia* from root nodules of a legume.
8. Isolation of microbes from phylloplane.
9. Isolation of mycorrhizae
10. Determination of soil organic matter.

**Model Question Paper for Practical Examination**

Semester – I/Agriculture Core Course – 1

**Fundamentals of Soil Microbiology**

Max. Time: 3 Hrs.

Max. Marks: 50

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- |  |              |
|--|--------------|
| 1. Experiment 'A' (Soil composition and structure)                           | 10 M         |
| 2. Experiment 'B' (Isolation of bacteria/cyanobacteria/algae/ Actinomycetes) | 10 M         |
| 3. Experiment 'C' (Soil Organic Matter)                                      | 10 M         |
| 4. Identify the following and justify with reasons                           | 2 x 5 = 10 M |
| D. Mycorrhiza  |              |
| E. Rhizobia  |              |
| 5. Record + Viva voce  | 5 + 5 = 10 M |

**Agri-2**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**  
**I B.Sc., - SEMESTER- II: Agriculture Core Course – 2 Syllabus**  
(w.e.f 2021-22 admitted batch)

**Principles of Agronomy**  
(Total hours of teaching – 60 @ 04 Hrs./Week)

**Theory:**

**Learning Outcomes:** On successful completion of this course, the students will be able to :

- Develop critical understanding on various aspects of agronomy.
- Explain the nutrition and application of nutrients to plants.
- Explain the cropping methods and crop rotation.
- Realize various weed management practices.
- Explain the different aspects of crop harvesting.

**Unit – 1: Basics of Agronomy**

**12 Hrs.**

1. Agronomy- definition, scope; role of Agronomist and relationship of Agronomy with other sciences.
2. Tillage - definition, objects of tillage, types of tillage, tillage implements and factors affecting tillage, Effect of tillage on soil and crop growth.
3. **Tilth- definition, characteristics and ideal tilth; modern concepts of tillage, minimum, zero and stubble mulch tillage, importance of puddling.**
4. **Seed - definition, characteristics of quality seed, seed treatment and its objectives; methods of sowing seed and sowing implements.**

**Unit – 2: Crop communities**

**12 Hrs.**

1. Effect of plant population on growth and yield, planting geometry viz., solid, paired and skipped row planting.
2. Role of plant nutrients in crop production, Importance of manures and fertilizers and its classification.
3. **Methods and time of application of manures, fertilizers and green manuring.**
4. Nutrient use efficiency, meaning and factors affecting nutrient use efficiency.

**Unit – 3: Growth and development**

**12 Hrs.**

1. Growth and development- definition, growth curve and factors affecting growth and development.
2. Plant ideotypes - definition and types of ideotypes.
3. Crop rotation, its definition, principles and advantages of crop rotation.
4. Study of crop adaptation and its distribution.

**Unit – 4: Weed management**

**12 Hrs.**

1. Weeds, its definition, characteristics of weeds, merits and demerits of weeds.
2. Classification of weeds, meaning of crop weed competition and its period in different crops.
3. **Principles and methods of weed management viz., cultural, mechanical, chemical, biological weed control methods and integrated weed management.**
4. Classification of herbicides, its selectivity and resistance, Allelopathic effect of weed.

**Unit – 5: Crop harvesting**

**12 Hrs.**

1. Crop harvesting, signs of maturity in different field crops; physiological and crop maturity.
2. **Methods of threshing crops, cleaning, drying and storage of field crops.**

3. Rainfed agriculture: Introduction, types, History of rainfed agriculture and watershed in India.
4. Problems and prospects of rainfed agriculture in India; Soil and climatic conditions prevalent in rainfed areas.

#### **Books for Reference:**

- **Gopal Chandra De. 1980.**, Fundamentals of Agronomy. Oxford and IBH Publishing Co. Ltd., Bangalore.
- **Panda, S.C., 2006.** Agronomy, Agribios Publication, New Delhi.
- **Reddy, S.R. 2011.** Principles of Agronomy Kalyani Publishers, Ludhiana, India.
- **Sankaran, S. and V.T. Subbiah Mudliyar, 1991.** Principles of Agronomy. The Bangalore Printing and Publishing Co. Ltd., Bangalore.
- **Rao V.S., 2006.** Principles of Weed Science. Oxford and IBH Publishing Co., New Delhi, India.

#### **Suggested co-curricular activities Agronomy Core Course -2 in Semester-II:**

##### **A. Measurable:**

###### **a. Student seminars:**

1. Water Resources of India and Andhra Pradesh and Development.
2. Soil- water–plant Relationship.
3. Classification of Soil Water, Soil Moisture Constants, Soil Moisture characteristic Curve.
4. Water requirement of different Agronomic crops.
5. Water Use efficiency of crops, Irrigation Efficiencies and factors affecting it.
6. Crop management techniques in problematic areas i.e. saline, alkaline, acidic soils.
7. Study of Drip System, Fertigation, Care and Maintenance of Drip system.
8. Study of Pressurized irrigation system, Sprinkler, Rain gun.
9. Top dressing and foliar feeding of nutrients.
10. Studies on cropping pattern of different rainfed areas in the country.
11. Drought - classification and effect on crop growth.
12. Post-harvest management in Organic Farming.

###### **b. Student Study Projects:**

1. Morphological description of kharif season crops.
2. Morphological description of kharif season crops.
3. Study of yield contributing characters and yield calculation of a kharif season crop.
4. Study of morphological characteristics of rabi crops.
5. Identification of weeds in rabi season crops.
6. Study of yield contributing characters of rabi season crops.
7. Study the effect of seed size on germination and seedling vigour of kharif season crops.
8. Study the effect of seed size on germination and seedling vigour of rabi season crops.

**c. Assignments:** Written assignment at home / during '0' hour at college; preparation of charts with drawings, making models etc., on topics included in syllabus.

##### **B. General:**

1. Group Discussion (GD)/ Quiz/ Just A Minute (JAM) on different modules in syllabus of the course.
2. Visit to research centers of related crop; Visit to rainfed research station/ watershed areas.



**GOVERNMENT COLLEGE (AUTONOMOUS),  
RAJAMAHENDRAVARAM**  
**I year B.Sc., Program Examinations at II Semester /Agriculture Core Course - 2**  
**Principles of Agronomy**  
**Model Question Paper (w.e.f. 2021-22)**

**Time : 2 ½ Hrs.**

**Max. Marks :50**

**Section – A**

**5 x 4 = 20M**

**Answer any FIVE of the following questions. Draw diagrams wherever necessary.**

1. Weather abnormalities
2. Agriculture as science
3. Characters of good tilth.
4. Seed treatment
5. Manures
6. Biofertilizers
7. Allelopathy
8. Water shed management

**Section – B**

**3 x 10 = 30 M**

**Answer any Three of the following questions. Draw neat and labeled diagrams wherever necessary.**

9. Write an essay on agroclimatic zones of India.
10. Define tillage? Describe various types of tillages and tillage implements.
11. Write an account on irrigation water resources and methods of irrigation.
12. Give an account on weed control methods.
13. Write detailed account on dryland agriculture.
14. Discuss about crop developmental stages. Add a note on growth and yield analysis

**Blue print of the question paper**

Unit no. / Title	SAQ	LAQ	Marks allotted to the Module
Unit- 1 / Introduction to Agronomy and Agro-meteorology	2	1	18
Unit- 2 / Tillage and Plant Population	2	2	28
Unit – 3/ Nutrient and Irigation Water Management	2	1	18
Unit- 4 / Weed Management	1	1	14
Unit– 5 / Cropping and Farming Systems	1	1	14
Total marks allotted to all questions including choice =	<b>08</b>	<b>06</b>	<b>92</b>

**Note :** Question paper setters are requested to adhere strictly to the above blue Print while preparing the said paper.

## Principles of Agronomy

(Total hours of laboratory exercises 30 Hrs. @ 02 Hrs./Week)

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**Course outcomes:** On successful completion of this course, the students shall be able to:

- Study and record the growth parameters in plants in relation to agro-climatic conditions.
  - Apply fertilizers and pesticides as per the requirement at different stages of crop growth.
1. Identification of seeds and crop plants at different growth stages.
  2. Identification of different tillage implements.
  3. Identification of fertilizers and pesticides.
  4. Identification of weed flora in different field crops.
  5. Study of agro-climatic zones of Andhra Pradesh and India.
  6. Operational tillage viz., primary, secondary, inter-tillage, sowing, harvesting, harvesting implements, Working with them.
  7. Calculation of plant population, seed rate, fertilizer and herbicide dose for different field crops.
  8. Determination of purity and germination percentage of seed, Methods of seed germination.
  9. Study of viability test and practice of seed treatments in different field crops.
  10. Study of yield contributing characters and yield estimation in different field crops.
  11. Methods of application of herbicides in different field crops.
  12. Measurement of air and soil temperatures, tabulation and variation.

### Model Question Paper for Practical Examination

Semester – II/ Agriculture Core Course – 2

### Principles of Agronomy

Max. Time: 3 Hrs.

Max. Marks: 50

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|---|--------------|
| 1. Experiment 'A' (Operational tillage)   | 10 M         |
| 2. Experiment 'B' (Calculation of plant population, seed rate, fertilizer and herbicide dose for a field crop). | 10 M         |
| 3. Experiment 'C' (Seed germination/viability test)   | 10 M         |
| 4. Identify the following and justify with reasons  | 2 x 5 = 10 M |
| D. Seed/tillage implement   |              |
| E. Fertilizer/pesticide/weed  |              |
| 5. Record + Viva voce   | 5 + 5 = 10 M |

**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**  
**II B.Sc., - SEMESTER- III: Agriculture Core Course – 3 Syllabus**  
(w.e.f 2021-22 admitted batch)

**Basics of Entomology**

(Total hours of teaching – 60 @ 04 Hrs./Week)

**Theory:**

**Learning Outcomes:** On successful completion of this course, the students will be able to:

- Develop critical understanding on various aspects of agronomy.
- To understand the concept of Insect pest of crops
- To understand the control method of pest and their management.
- To understand the beneficial insects.
- To understand Economic importance of ticks and mites

**UNIT I: Introduction to Entomology**

**10 Hrs.**

1. Origin and evolution of insects
2. **Classification and identification of economically important insect orders**
3. Types of mouth parts
4. Insect-plant interaction
5. Insects transmitting diseases in plants

**UNIT II: Insects pests of crops**

**14 Hrs.**

1. **Pests of paddy:** 1. *Leptocorisa acuta* (= *L varicoml*) 2. *Scirpophaga* (= *Tryporyza*) *incertulas*
2. **Pest of maize:** *Chilo partellus* (= *C. zonellus*)
3. **Pests of cotton:** 1. *Aphis gossypii* 2. *Peciinophora gossypiella*
4. **Pests of sugarcane:** 1. *Scirpophaga* (= *Tryporyza*) *nivella* 2. *Emmalocera depressella*
5. **Pests of oilseeds:** 1. *Amsacta albistriga* and *A. moorei* 2. *Lipaphis erysimi*

**UNIT III: Insects Pest Management**

**12 Hrs.**

1. **Methods of insect pest management** (physical, mechanical and cultural control methods)
2. **Safe storage of food grains against insect pests**
3. **Storage receptacles for food grains**
4. Management of Insect pests of stored food grains

**UNIT IV: Beneficial Insects**

**14 Hrs.**

1. Insects as suppliers of useful products, insect used in medicine, insects as pollinators of crops, insects as bio-agents in natural and biological control of crop pests, insects used as food
2. Species of honey bees, life history and habits of the honey bees, methods of commercial bee keeping
3. **Sericulture: Species of silkworms, biology of *Bombyx mori***
4. **Lac Culture: Rearing lac insect distribution, biology of lac insect, lac rearing, preparation of marketable lac**

**UNIT V: Ticks and Mites of Economic Importance**

**10 Hrs.**

1. Cattle ticks, rocky mountain wood tick
2. Spinose ear tick, control measures of ticks
3. Zoo parasite mites
4. Phyt parasitic Mites

**Books for Reference:**

- **Richards, O.W. and Davies, R.G 1977.** Imm's General Text Book of Entomology (Vol. I and II). Chapman and Hall, London.
- **Gullan, P.J. and Cranston, P.S. 2000.** The Insects, An Outline of Entomology, 2nd Ed. Blackwell Science, U.K
- **Pedigo L. P. (2002).** Entomology and Pest Management, Prentice Hall Publication.
- **Evans JW. 2004.** Outlines of Agricultural Entomology. Asiatic Publ., New Delhi.
- **Gillott, C. 1995.** Entomology, 2nd Ed. Plenum Press, New York, London.
- **Chapman, R. F 2013** Insects: Structure and Function. Ed by Simpson, S. J. and Douglas, A. C. Cambridge Univ. Press, UK.
- **Timbhare, D.B. 2015.** Modern Entomology, Himalaya Publishing House.
- **Vasantharaj David, B. and Rama Murthy V.V. 2016.** Elements of Economic Entomology, Popular Book Depot, Coimbatore.

### **Suggested co-curricular activities for Agriculture Core Course -3 in Semester-III:**

#### **A. Measurable:**

##### **a. Student seminars:**

1. *Chilo suppressalis* on paddy
2. *Hieroglyphus banian* on paddy
3. *Earias insulana* and *Earias vittella* on cotton
4. *Dysdercus cingulatus* and *D. koenigii* on cotton
5. *Aleurolobus barodensis* on sugarcane
6. *Bagrada cruciferarum* (= *B. picta*) on oil seeds
7. Segmentation and Body Regions
8. Mouthparts (typical mandibulate mouthparts)
9. Feeding behavior in insects
10. Blood of insects
11. Types of tracheal system and respiration in aquatic insects
12. Types of larvae
13. Types of receptors

##### **b. Student Study Projects:**

1. Plants mimicking insects
2. A report on bioluminescence and sound producing insects.
3. Study of wing venation, types of wings and wing coupling mechanisms.
4. Study of different types of insect larva and pupa.
5. Study of insect pollinators, weed killers and scavengers.
6. Chromatographic analysis of free amino acids of haemolymph

**c. Assignments:** Written assignment at home / during '0' hour at college; preparation of charts with drawings, making models etc., on topics included in syllabus.

#### **B. General:**

1. Group Discussion (GD)/ Quiz/ Just A Minute (JAM) on different modules in Syllabus
1. Visit to soil science and microbiology laboratories in Agriculture / University/ Research Station/ silkworm rearing and bee keeping centre

**Agri-3**  
**GOVERNMENT COLLEGE (A), RAJAMAHENDRAVARAM**  
**II year B.Sc., Program Examinations at III Semester /Agriculture Core Course - 3**  
**Basics of Entomology**  
**Model Question Paper (w.e.f. 2021-22)**

**Time: 2 ½ Hrs.**

**Max. Marks:50**

**Section – A**

**5 x 4 = 20M**

**Answer any Five of the following questions. Draw diagrams wherever necessary.**

15. Insect plant interaction
16. Types of insect mouth parts
17. Pests of maize.
18. Pest of oil seeds
19. Metallic bins for household storage
20. Insects used as food
21. Preparation of marketable lac
22. Control measures of ticks

**Section – B**

**3 x 10 = 30 M**

**Answer any Three of the following questions. Draw neat and labeled diagrams wherever necessary.**

23. Write an essay on insect transmitting diseases on plants.
24. Enumerate some major insect pests of paddy.
25. Write an account on Methods of insect pest management
26. Give an account of the life history of honey bee or silk moth.
27. Write an essay on economic importance of ticks and mites.
28. Give an account on lac insect rearing and preparation of marketable lac.

**Blue Print of Question Paper**

Unit no. / Title	SAQ	LAQ	Marks allotted to the Module
Unit- 1/ Introduction to Entomology	2	1	20
Unit- 2/ Insect pests of crops	2	1	20
Unit – 3/ Insect Pests Management	1	1	15
Unit- 4 / Beneficial Insects	2	1	20
Unit– 5 / Ticks and Mites of Economic Importance	1	2	25
Total marks allotted to all questions including choice =	08	06	100

**Note:** Question paper setters are requested to adhere strictly to the above blue print

## Practical syllabus of Agriculture Core Course – 3/ Semester – III

### II Year B.Sc., Program Examinations at III Semester /Agriculture Core Course - 3 Basics of Entomology

(Total hours of laboratory exercises 30 Hrs. @ 02 Hrs./Week)

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**Course Outcomes:** On successful completion of this course, the students shall be able to

- Perform various tests on physico-chemical parameters of soil.
  - Isolate and culture various soil microbes in the laboratory.
  - Determine the organic matter in a given soil sample.
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#### Practical syllabus:

1. Methods of Collection and preservation of insects including immature stages.
2. Study of characters of orders Othoptera, Dictyoptera, Hemiptera
3. Study of types of mouthparts – Biting and chewing, piercing and sucking, rasping and sucking, chewing and lapping, sponging and siphoning.
4. Calculations on the doses of insecticides and their application techniques.
5. Identification of major insect pests of rice and their damage symptoms
6. Identification of insect pests of sugarcane and their damage symptoms
7. Methods of grain sampling under storage condition. Determination of moisture content of grain
8. Methods of detection of infestation by stored grains insect pests in stored grain
9. Assessment of losses in stored grain due to insect pests.
10. Seasonal management of honey bees and their enemies and diseases.
11. Acquaintance with silkworm species and small scale rearing of mulberry silkworm.
12. Identification of various lac products.

#### Model Question Paper for Practical Examination

Semester – III/ Agriculture Core Course – 3

#### Basics of Entomology

Max. Time: 3 Hrs.

Max. Marks: 50

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- |  |              |
|--|--------------|
| 1. Experiment 'A' (Major experiment)               | 15 M         |
| 2. Experiment 'B' (Minor experiment).              | 10 M         |
| 3. Identify the following and justify with reasons | 3 x 5 = 15 M |
| C. Insect  |              |
| D. Insect product                                  |              |
| E. Pest effected plant                             |              |
| 5. Record + Viva voce                              | 5 + 5 = 10 M |

**Agri-04**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**  
**II B.Sc., – Agriculture-4/ IV Semester End (W.E.F. 2022-2023)**

**Principles of Plant Breeding**

Total Hrs. of Teaching-Learning: 60 @ 4 h / Week

Total Credits: 03

**II. Learning Outcomes:**

1. Compare and contrast the methods of reproduction and also pollination mechanisms.
2. Design appropriate pollination method for a given crop plant.
3. Recommend the best possible breeding method for a crop species.
4. Propose the steps for production of hybrid varieties of crop plants.
5. Apply molecular techniques to develop a tailored plant variety.

**Unit-1: Basic concepts of plant breeding**

**10 Hrs.**

1. Definition, aim, objectives and scope of plant breeding; concepts in plant breeding: genetic variation, heritability, and selection.
2. Advantages and disadvantages of asexual and sexual reproduction; apomixis: definition, types and significance.
3. A brief account of self and cross-pollination, their genetic consequences and significance; **classification of crop plants based on mode of pollination and mode of reproduction.**

**Unit-2: Contrivances in plants**

**12 Hrs.**

1. Self-incompatibility in plants – Definition, heteromorphic and homomorphic systems; exploitation of self-incompatibility in hybrid production.
2. Male sterility- Genetic, cytoplasmic and cytoplasmic-genetic, utilization in plant breeding.
3. Domestication of plants, centres of origin of crop plants.

**Unit-3: Breeding methods in plants**

**14 Hrs.**

1. **Plant introduction** – types, objectives, plant introduction agencies in India, procedure, merits and demerits; germplasm collections, genetic erosion, gene sanctuaries.
2. **Selection** – natural and artificial selection – basic principles of selection.
3. Self-pollinated crops: pure line selection method – procedure, advantages and disadvantages, achievements.
4. **Vegetatively propagated crops:** Clonal selection - procedure, advantages and disadvantages, achievements.

**Unit-4: Breeding methods in cross-pollinated plants**

**12 Hrs.**

1. **Hybridization** – objectives, types, procedure, advantages and disadvantages, achievements.
2. **Cross-pollinated crops:** back cross method - procedure, advantages and disadvantages, achievements.
3. **Heterosis:** definition, genetic basis of heterosis – dominance, over dominance and epistasis hypotheses; physiological basis of heterosis – commercial utilization.
4. Synthetics and composites – production procedures – merits, demerits and achievements.

**Unit-5: Modern methods in plant breeding**

**12 Hrs.**

1. **Mutation breeding:** spontaneous and induced mutations – characteristic features of mutations – procedure of mutation breeding – applications – advantages, limitations and achievements.
2. Polyploidy breeding: auto-polyploids and allopolyploids – applications in crop improvement and limitations.
3. **DNA markers and their applications in plant breeding: RFLP, SSR, and SNP**
4. **Marker Assisted Selection (MAS) and its applications in plant breeding.**

**References:**

- Acquaah, G. 2012. Principles of plant genetics and breeding, 2nd ed. Wiley-Blackwell, Ames, Iowa, USA.
- Allard, R. W. 1999. Principles of plant breeding. John Wiley & Sons, New York, USA.
- Singh, B. D. 2001. Plant breeding: Principles and methods. Kalyani Publishers, New Delhi, India.
- Poehlman, J. M. and Sleper, D. A. 1995. Breeding field crops, 4th ed. Iowa State University Press, Ames, Iowa, USA.
- Stuber, C. W., Edwards, M. D. and Wendel, J. F. 1987. Molecular markers in plant breeding: Applications and potential. Science 238: 1659-1664.
- Hayes, H. K., R. E. Kirk, and R. H. Jones (1951). Methods for the Statistical Analysis of Plant Breeding Experiments. Iowa State College Press, Ames, IA.
- Simmonds, N. W. (1979). Principles of Crop Improvement (2nd ed.). Longman, Harlow, UK.



**Agri-04**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**  
**I B.Sc., - SEMESTER- IV: Agriculture Core Course – 4**  
**Model Question Paper (w.e.f. 2022-23)**  
**Principles of Plant Breeding**

Time: 2 ½ Hrs.

Max. Marks: 50

**Section –A**

**5 x 4 = 20 M**

**Answer any FIVE of the following questions. Draw diagrams wherever necessary.**

1. Objectives and scope of plant breeding
2. Heteromorphic incompatibility in plants
3. Plant introduction agencies in India
4. Achievements of pureline selection method
5. Advantages and disadvantages of hybridization
6. physiological basis of heterosis
7. RFLP
8. Autopolyploids

**Section – B**

**3 x 10 = 30 M**

**Answer any THREE of the following questions. Draw neat labelled diagrams wherever necessary.**

9. Discuss the advantages and disadvantages of asexual and sexual reproduction.
10. Explain about the genetic and cytoplasmic male sterility in plants.
11. Give an account of clonal selection applied for vegetatively propagated plants.
12. Describe the procedure, advantages and disadvantages of back cross method.
13. Write an essay on procedure and applications of mutation breeding.
14. Explain the basic principles of selection.

**Blue print for Course - 4: Principles of Plant Breeding**

<b>Unit no. / Title</b>	<b>SAQ (4 Marks)</b>	<b>LAQ (10 Marks)</b>	<b>Marks allotted to the Module</b>
<b>Unit – 1 / Basic concepts of plant breeding</b>	1	1	14
<b>Unit – 2 / Contrivances in plants</b>	1	1	14
<b>Unit – 3 / Breeding methods in plants</b>	2	1	18
<b>Unit – 4 / Breeding methods in cross-pollinated plants</b>	2	1	18
<b>Unit – 5 / Modern methods in plant breeding</b>	2	1	18
<b>From any of the five units (I to V)</b>	0	1	10
<b>Total Questions &amp; Marks</b>	<b>8</b>	<b>6</b>	<b>92</b>

**Note:** Question paper setters are requested to adhere strictly to the above blue print while preparing the said paper

**Agri-05**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**  
**II B.Sc., – Agriculture-5/ IV Semester End (W.E.F. 2022-2023)**  
**Basic Concepts of Plant Pathology and Plant Diseases**

Total Hrs. of Teaching-Learning: 60 @ 4 h / Week

Total Credits: 03

**Learning Outcomes:**

1. Identify major groups of plant pathogens and classify plant diseases.
2. Explain various stages in infection, plant pathogenesis and responsible factors.
3. Perform skills related to plant disease management.
4. Elaborate the preventive and control measures for plant diseases.
5. Discuss about some diseases of field crops and their management.

**Unit-1: Plant pathogens, survival and dispersal** **10 Hrs.**

1. Plant pathology: definition, importance of plant diseases, important famines in world; scope and objectives of plant pathology.
2. Important plant pathogenic organisms with examples of diseases caused by them.
3. Classification of plant diseases based on important criteria.
4. A brief account on survival of plant pathogens.
5. Dispersal of plant pathogens – active and passive processes.

**Unit-2: Infection and pathogenesis in plants** **10 Hrs.**

1. Infection process – pre-penetration, penetration and post-penetration.
2. Role of enzymes in plant pathogenesis.
3. Role of toxins in plant pathogenesis.
4. Role of growth regulators in plant pathogenesis.
5. Defense mechanism in plants against pathogens.

**Unit-3: Plant disease management** **10 Hrs.**

1. Plant disease epidemiology; plant disease forecasting; remote sensing in plant pathology.
2. General principles of plant diseases management.
3. Regulatory methods, cultural methods; biological control and PGPR.
4. Physical methods, chemical methods; host plant resistance.
5. Integrated plant disease management (IDM) – Concept, advantages and importance.

**Unit-4: Diseases of field crops -1** **15 Hrs.**

Symptoms, etiology, disease cycle and management of major diseases of following crops:

- A) **Rice:** Blast of Rice, Bacterial leaf blight, Tungro disease
- B) **Sugar cane:** Red rot, Grassy root, Mosaic
- C) **Bajra:** Green ear (Downy mildew)
- D) **Wheat:** Loose smut
- E) **Maize:** Charcoal rot

**Unit-5: Diseases of field crops -2** **15 Hrs.**

Symptoms, etiology, disease cycle and management of major diseases of following crops:

- A) **Red gram:** Stem blight, Sterility mosaic
- B) **Ground nut:** Tikka leaf spots, Peanut Stem Necrosis Disease (PSND)
- C) **Cotton:** Bacterial blight, Root rot
- D) **Sunflower:** Leaf blight, Powdery mildew
- E) **Mustard:** White rust, Downy mildew

**References:**

- Agrios, G. N. (2005). Plant Pathology (5th ed.). Academic Press, San Diego, California.
- Dehne, H. W. (Ed.). (2012). Plant Pathology: From Molecular Biology to Biological Control. Springer, Dordrecht, Netherlands.

- Dicklow, M. B., & Beaudry, R. M. (Eds.). (2013). *Plant Pathology Concepts and Laboratory Exercises* (2nd ed.). CRC Press, Boca Raton, Florida.
- Lucas, J. A. (1998). *Plant Pathology and Plant Pathogens*. Blackwell Science, Oxford, UK.
- Lucas, J. A. (1998). *Plant pathology and plant pathogens*. Blackwell Science, Oxford, UK.
- Schumann, G. L., & D'Arcy, C. J. (2010). *Essential Plant Pathology* (2nd ed.). APS Press, St. Paul, Minnesota.
- Schumann, G. L., and C. D'Arcy (2010). *Essential plant pathology*. APS Press, St. Paul, MN.
- Singh, R. P., and U. S. Singh (2020). *Plant diseases: Identification, management and challenges*. Springer, Singapore.

**Agri-05**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**  
**I B.Sc., - SEMESTER- IV: Agriculture Core Course – 5**  
**Model Question Paper (w.e.f. 2022-23)**  
**Basic Concepts of Plant Pathology and Plant Diseases**

Time: 2 ½ Hrs.

Max. Marks: 50

**Section –A**

**5 x 4 = 20 M**

**Answer any FIVE of the following questions. Draw diagrams wherever necessary.**

1. Importance of plant diseases
2. Role of auxins in plant pathogenesis
3. Biological control of plant diseases
4. Mosaic disease in sugarcane
5. Sterility mosaic in red gram
6. Advantages and importance of IDM
7. Active dispersal of plant pathogens
8. Role of pectinases in plant pathogenesis

**Section – B**

**3 x 10 = 30 M**

**Answer any THREE of the following questions. Draw neat labelled diagrams wherever necessary.**

9. Write an essay on important plant pathogenic organisms and diseases caused by them
10. Explain the role of toxins in plant pathogenesis.
11. Discuss the general principles of plant diseases management.
12. Describe the various aspects of blast disease in Rice.
13. Write an essay on leaf blight and powdery mildew diseases in sunflower.
14. Explain the penetration and post-penetration stages in plant pathogenesis.

**Blue print for Agriculture Core Course - 5**  
**Basic Concepts of Plant Pathology and Plant Diseases**

Unit no. / Title	SAQ (4 Marks)	LAQ (10 Marks)	Marks allotted to the Module
<b>Unit – 1 / Plant pathogens, survival and dispersal</b>	1	1	14
<b>Unit – 2 / Infection and pathogenesis in plants</b>	2	1	18
<b>Unit – 3 / Plant disease management</b>	1	1	14
<b>Unit – 4 / Diseases of field crops-1</b>	2	1	18
<b>Unit – 5 / Diseases of field crops -2</b>	2	1	18
<b>From any of the five units (I to V)</b>	0	1	10
<b>Total Questions &amp; Marks</b>	<b>8</b>	<b>6</b>	<b>92</b>

**Note:** Question paper setters are requested to adhere strictly to the above blue print while preparing the said paper

**Model Question Paper for Practical Examination**  
**Semester – IV/ Botany Core Course – 5**  
**Basics of Plant Pathology and Plant Diseases**

**Max. Time: 3 Hrs.**

**Max. Marks: 50**

1. Experiment 'A' - Demonstrate Koch postulates for Fungi/Bacteria 14 M
2. Take T.S. of the material 'B', make a temporary slide, draw diagrams and justify the identification with apt points. 12 M
3. Identify and comment on following 4 x 4 = 16 M
  - C: Equipment in Plant Pathology laboratory
  - D: Culture medium for Fungi/Bacteria
  - E: Plant Disease
  - F: Plant Disease
6. Record + Viva-voce 5+3 = 8 M

**Agri-E1**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**  
**III B.Sc., - SEMESTER- V: Agriculture Core Course Syllabus**  
**6A: Organic Farming**  
**Total hours of teaching – Theory: 45 @ 03 Hrs. /Week.**

**I. Learning Outcomes:** Students at the successful completion of the course will be able to:

1. Compare and contrast the advantages and disadvantages of conventional and organic farming.
2. Acquire skills in different composting methods.
3. Acquaint with cultural and crop protection practices related to organic farming.
4. Acquire knowledge on various management practices in organic farming.
5. Discuss the certification and marketing of organic foods.
6. Explain the initiatives of the government in promoting organic farming

**II. Syllabus of Theory:**

**UNIT-1: Basic concepts of organic farming** **8 Hrs.**

1. Organic farming: Definition, ecological social and economic benefits.
2. Organic farming and its components; concepts and principles.
3. Biodynamic and natural farming approaches; permaculture and LEISA farming approaches.
4. Sustainable agriculture, key indicators of sustainable agriculture.
5. Living soil and healthy plant concepts.

**UNIT-2: Organic inputs for soil** **8 Hrs.**

1. Vermicompost production technology.
2. Organic manures: Farmyard Manure (FYM), enrichment of FYM.
3. Compost, methods of composting (Bangalore, Indore, Coimbatore, NADEP methods).
4. Green manuring, classification of green manures.
5. Classification of organic residues; recycling of organic residues.

**UNIT-3: Organic crop management** **10 Hrs.**

1. Introduction to organic crop management – land preparation, planting technic, nutrient management.
2. Factors considered for nutrient management; recommended nutrient quantity –blanket, major problems; balance sheet method.
3. Nutrient composition of some organic resources, right timing of nutrient application.
4. Right method of nutrient application, nutrient use efficiency.

**UNIT-4: Cultural and crop protection practices** **10 Hrs.**

1. Pre-sowing irrigation; crop rotation, intercropping and mixed cropping.
2. Use of tolerant and resistant varieties; manipulation in sowing dates, irrigation/flooding, destruction of volunteer plants.
3. Pest and disease management – preventive, physical and mechanical methods.
4. Organic crop management – rice, red gram, groundnut, and tomato.
5. Government interventions to promote organic farming: NPOF, NPMSHF, NHM, RKVY, KVK and APEDA.

**UNIT-5: Certification and Marketing of Organics** **9 Hrs.**

1. Organic certification process – definition, need, aim and scope, requirements to maintain certification.
2. Organic certification process – product labeling, NPOP, organic quality control, standards, accreditation, inspection, and certification.
3. Operational structure of organic certification.
4. Marketing of organic products.

### **III. Text Books:**

1. Vandana Shiva, Poonam Pande and Jitendra Singh, (2004). Principles of Organic Farming - Renewing the Earth's Harvest, Navdanya, New Delhi.
2. Sujit Chakrabarty, Sumati Narayan, Farooq Ahmad Khan, (2019). Arts and Science of Organic Farming, Purna Organics
3. Thapa, U., and P. Tripathi, (2016). Organic Farming in India, Agrotech Publications, Udaipur
4. Peter, V. Fossel, (2007). Organic Farming (Everything You Need to Know), Voyageur Press, USA

### **IV. Reference Books:**

1. Richard Wiswall (2009), The Organic Farmer's Business Handbook Chelsea Green Publishing, White River Junction, VT, USA.
2. William Lockeretz (2007), Organic Farming: An International History CABI Publishing, Wallingford, UK.
3. Ann Larkin Hansen (2010), The Organic Farmer's Manual: A Comprehensive Guide to Starting and Running a Certified Organic Farm Storey Publishing, North Adams, MA, USA. Masanobu Fukuoka (1978), The One-Straw Revolution: An Introduction to Natural Farming Rodale Press, Emmaus, PA, USA.
4. Gary Zimmer (2000), The Biological Farmer: A Complete Guide to the Sustainable & Profitable Biological System of Farming Acres U.S.A., Austin, TX, USA
5. Albert Howard (1947), The Soil and Health: A Study of Organic Agriculture University Press of Kentucky, Lexington, KY, USA.
6. Terri Paajanen (2014), The Complete Guide to Organic Livestock Farming Atlantic Publishing Group, Inc., Ocala, FL, USA.

**Practical syllabus of Botany Major Course: Semester – V**

**6A: Organic Farming**

(Total hours of laboratory exercises 30 Hrs. @ 02 Hrs./Week)

**I. Course outcomes:** On successful completion of this practical course, students shall be able to:

1. Prepare different organic formulations for organic farming.
2. Design a vermicompost unit and prepare the compost.
3. Identify various manures for organic farming.

**II. Laboratory/field exercises:**

1. Preparation of Jeevamrutham (liquid and solid) and Beejamrutham.
2. Preparation of Neemastram and Brahmastram.
3. Preparation of Agniasttram and Dashaparni Kashayam.
4. Study of intercropping method.
5. Study of water management in Organic Farming.
6. Study of livestock component in Organic Farming.
7. Hands on training on vermicompost preparation.
8. Study of different organic and green manures.



**Agri-E2**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**  
**III B.Sc., - SEMESTER- V: Agriculture Core Course Syllabus**  
**7A: Agroforestry**

**Total hours of teaching – Theory: 45 @ 03 Hrs. /Week.**

**I. Learning Outcomes:** Students at the successful completion of the course will be able to:

1. Explain the concepts and economic value of agroforestry.
2. Acquire a critical knowledge on systems and design of agroforestry.
3. Discuss the silviculture practices in relation to agroforestry.
4. Evaluate the role of agroforestry to reclaim the waste lands.
5. Perform skills in relation to tree measurement techniques.

**II. Syllabus of Theory:**

**Unit-1: Basic concepts of Agroforestry** **8 Hrs.**

1. Forest and Agroforestry. Definition, objectives, scope and advantages of agroforestry; classification of agroforestry; differences between social forestry and agroforestry.
2. Agroforestry practices as existing in India and Andhra Pradesh.
3. Criteria for selection and screening of tree species; design and diagnosis methodology in relation to agroforestry.

**Unit-2: Systems of Agroforestry** **8 Hrs.**

1. Global agroforestry system: shifting cultivation, taungya cultivation, shelter belt and wind breaks, and energy plantation and homestead gardens.
2. Multipurpose tree species and their characteristics; criteria for selection of agroforestry design, role tree architecture and management in agroforestry.
3. Alley cropping, high density short rotation plantation systems, silvicultural woodlots, energy plantations.

**Unit-3: Silviculture of Agroforestry trees** **12 Hrs.**

1. Silviculture: Definition, objectives and scope and its place in agroforestry.
2. Choice of species, site selection, and pure verses mixed crop, planting techniques and methods, protection of seedlings/ plantations from environmental and biological adversaries, tending operations, concept of coppice etc.
3. Silviculture of agroforestry trees with special reference to: (a) *Azadirachta indica*, (b) *Tectona grandis* (c) *Embllica officinalis* and (d) *Tamarindus indica*.

**Unit-4: Waste land reclamation** **10 Hrs.**

1. Wasteland definition, types: ecological characteristics, landslides, soil erosion, hoods, drought, salinity, water logging and fire.
1. Biological causes of deforestation, grazing, shifting cultivation and faulty agricultural practices.
2. Reclamation of wastelands, scientific land use practices, afforestation, soil conservation practices, improvement of water catchment areas and development of recreational and amenity areas.

**Unit-5: Measurements in Agroforestry** **7 Hrs.**

1. Tree measurement techniques: Instruments and methods for measurement of tree diameter, height, bark thickness, crown volume crown surface area.
2. Tree stem form, yield tables, volume tables, concept of sustained yield, and kind of tree rotation, increment and yield; estimation of biomass.

3. Determination of tree age and introduction of working plan.

### **III. Text Books:**

1. Dwivedi, A.P. (1992). Agroforestry: Principles and Practices. Oxford & IBH
2. Nair, P.K.R. (1993). An Introduction to Agroforestry. Kluwer Academic Publishers, Dordrecht, Netherlands
3. Rajeshwar Rao G., M. Prabhakar, G. Venkatesh, I. Srinivas and K. Sammi Reddy (2018) Agroforestry Opportunities for Enhancing Resilience to Climate Change in Rainfed Areas, ICAR-CRIDA, Hyderabad.

### **IV. Reference Books:**

1. Nair P.K.R., M.R. Rai and L.E.Buck, (2004). New Vistas in Agroforestry. Kluwer Academic Publishers, Dordrecht, Netherlands
2. Young, A. (1997). Agroforestry for Soil Management. CABI
3. Shibu Jose, Anu Rangarajan, and Catherine L. Bevier (2008) Agroforestry for Natural Resource Management, Springer, Dordrecht, Netherlands.
4. Andrew Gordon and Tony J. Marshall (2015) Agroforestry in Sustainable Agricultural Systems, CRC Press, Boca Raton, Florida, USA

## **Practical syllabus of Botany Major Course: Semester – V**

### **7A: Agroforestry**

(Total hours of laboratory exercises 30 Hrs. @ 02 Hrs./Week)

**I. Course Outcomes:** On successful completion of this practical course, student will be able to:

1. Identify suitable tree species for agroforestry and their products.
2. Demonstrate skills on raising tree species from seeds and by vegetative propagation.
3. Perform skills on measurements related to wood-based products.
4. Estimate biomass in an energy plantation.

### **II. Laboratory/field exercises:**

1. Identification of agroforestry tree-species.
2. Identification of important major and minor agroforest products.
3. Collection and maintenance of agroforest products and herbarium
4. Nursery lay out seed sowing and pre-sowing seed treatments.
5. Vegetative propagation techniques – hard wood cuttings and air layering.
6. Diameter measurements using callipers and tape; diameter measurements of forked, buttressed, fluted and leaning trees.
7. Height measurement of standing trees by shadow method, single pole method and hypsometer.
8. Volume measurement of logs using various formulae.
9. Biomass estimation in energy plantations.

**Agri-E1**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**  
**III B.Sc., - SEMESTER- V: Agriculture Core Course Syllabus**  
**6B: Integrated Pest and Disease Management**

**I. Learning Outcomes:** Students at the successful completion of the course will be able to:

- Discuss various categories of pest and disease management.
- Understand how IPM decisions are made and the influence of decision-making process.
- Perform the strategies and tactics of IPM
- Apply knowledge gained to solve actual pest management problems

**II. Syllabus of Theory:**

**Unit-1: Principles and tools of IPM** **10 Hrs.**

1. Categories of insect pests and diseases, IPM: Introduction, history, importance.
2. Concepts, principles and tools of IPM.
3. Economic importance of insect pests, diseases and pest risk analysis.

**Unit-2: Diagnosis and control** **10 Hrs.**

1. Methods of detection and diagnosis of insect pest and diseases.
2. Calculation and dynamics of economic injury level and importance of Economic threshold level.
3. Methods of control: Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control.

**Unit-3: Preventive measures** **8 Hrs.**

1. Ecological management of crop environment.
2. Different aspects of plant bio-security, bio-safety and preventive measures.
3. Introduction to conventional pesticides for the insect pests and disease management.

**Unit-4: Forecasting of pests and diseases** **8 Hrs.**

1. Survey surveillance and forecasting of Insect pest and diseases.
2. Development and validation of IPM module.
3. Implementation and impact of IPM, IPM module for Insect pest and disease.
4. Safety issues in pesticide uses; Political, social and legal implication of IPM.

**Unit-5: Control measures** **9 Hrs.**

1. Biological control- definition, its advantages and disadvantages.
2. Biocontrol agents, arachnids, fungi, bacteria, viruses, protozoa, Vertebrates.
3. Insects, parasitoids and predators-types of parasitism.
4. Methods of biological control- conservation, augmentation and importation; Bio-pesticides.

**III. Reference books:**

1. John R. Ruberson (2018) Handbook of Pest Management in Agriculture, CRC Press, Boca Raton, USA
2. R. Albajes, M. Lodovica Gullino, J.C. van Lenteren, and Y. Elad (2014) Integrated Pest and Disease Management in Greenhouse Crops, Springer, Dordrecht, Netherlands
3. William R. Jarvis and Richard J. Cook (2014) Principles of Plant Disease Management, Springer
4. H. D. Upadhyaya and R. K. Upadhyaya (2007) Crop Diseases and Their Management, Springer

**IV. Practical:**

1. Methods of diagnosis and detection of various insect pests, and plant diseases.
2. Methods of insect pests and plant disease measurement.
3. Assessment of crop yield losses, calculations based on economics of IPM.
4. Identification of biocontrol agents, different predators and natural enemies.
5. Mass multiplication of *Trichoderma*, *Pseudomonas*, *Trichogramma*, NPV etc.

6. Identification and nature of damage of important insect pests and diseases and their management.
7. Crop (agro-ecosystem) dynamics of a selected insect pest and diseases.
8. Plan & assess preventive strategies (IPM module) and decision making.
9. Crop monitoring attacked by insect, pest and diseases.

**Agri-E2**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**  
**III B.Sc., - SEMESTER- V: Agriculture Core Course Syllabus**  
**7B: Dryland Agriculture**

**I. Learning Outcomes:** Students at the successful completion of the course will be able to:

- Identify key factors influencing soil and water dynamics in arid and semi-arid regions.
- Evaluate the impact of various agricultural practices on soil conservation and water management.
- Analyze and choose appropriate crops for dryland farming based on environmental conditions.
- Design and implement water harvesting systems suitable for dryland agriculture.

**II. Syllabus:**

**UNIT-I: Introduction to Dryland Agriculture** **8 Hrs.**

1. Definition, concept and characteristics of dry land farming areas/regions.
2. Dry land versus rainfed farming.
3. Significance and dimensions of dry land farming in Indian agriculture.

**UNIT-II: Soil, climate and drought** **10 Hrs.**

1. Soil and climatic parameters with special emphasis on rainfall characteristics.
2. Constraints of crop production in dry land areas.
3. Types of drought, characterization of environment for water availability.
4. Contingent crop planning for erratic and aberrant weather conditions.

**UNIT-III: Adaptations of plants** **10 Hrs.**

1. Stress physiology and resistance to drought.
2. Adaptation of crop plants to drought, drought management strategies.
3. Preparation of appropriate crop plans for dry land areas.
4. Mid season contingent crop plan for aberrant weather conditions.

**UNIT-IV: Water conservation techniques** **10 Hrs.**

1. Tillage, tillth, frequency and depth of cultivation; compaction with soil tillage.
2. Concept of conservation tillage, tillage in relation to weed control and moisture conservation.
3. Techniques and practices of soil moisture conservation (use of mulches, kinds, effectiveness and economics); anti-transpirants.

**Unit-V: Water management in drylands** **7 Hrs.**

1. Soil and crop management techniques.
2. Seeding and efficient fertilizer use for increasing water use efficiency.
3. Watershed- concept, resource management, problems, approach and components.

**III. Reference books:**

1. Manoj Kumar Shukla (2014) Dryland Agriculture, Springer, India
2. J. S. Samra, M. S. Reddy, and P. C. Kesavan (2004) Dryland Farming: Strategies for Sustainable Agriculture in the Dry Tropics, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi
3. S. K. Chaudhuri and S. S. Prihar (2007) Dryland Agriculture in India: State of Art, Agrotech Publishing Academy, Udaipur
4. Y. S. Ramakrishna (2008) New India Publishing Agency, New Delhi

**IV. Practical:**

1. Seed treatment, seed germination and crop establishment in relation to soil moisture contents
2. Moisture stress effects and recovery behavior of important crops; estimation of moisture index and aridity index

3. Spray of anti-transpirants and their effect on crops
4. Collection and interpretation of data for water balance equations; methods of increasing water use efficiency
5. Preparation of crop plans for different drought conditions
6. Study of field experiments relevant to dryland farming
7. Visit to watershed projects

**Agri-E1**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**  
**III B.Sc., - SEMESTER- V: Agriculture Core Course Syllabus**  
**6C: Weed management**

**I. Learning Outcomes:** Students at the successful completion of the course will be able to:

1. Identify common weeds in agricultural settings and know their life cycles.
2. Summarize the economic and ecological impacts of weeds on crop yields.
3. Develop skills in monitoring weed populations and assessing the need for weed control measures.
4. Formulate weed control plans tailored to specific crops and practice sustainable weed management.

**II. Syllabus:**

**UNIT-I: Basics of weed biology** **10 Hrs.**

1. Classification and characteristics of weeds.
2. Special weed problems including aquatic and parasitic weeds.
3. Ecology and physiology of major weeds.
4. Ecophysiology of crop-weed competition including allelopathy.

**UNIT-II: Taxonomy and ecology of weeds** **10 Hrs.**

1. Identification of common weeds; morphology and anatomy of weeds.
2. Reproduction and dispersal mechanisms.
3. Growth habits and ecological adaptations.
4. Understanding weed biology for effective management

**UNIT-III: Weed control methods** **10 Hrs.**

1. Principles and methods of weed control.
2. Concept of integrated weed management.
3. Principles of chemical weed control.
4. Weed control through bioherbicides.

**UNIT-IV: Herbicides** **8 Hrs.**

1. Mode and mechanism of action of herbicides.
2. Herbicide selectivity, herbicide combinations, adjuvants and safeners.
3. Degradation of herbicides in soils and plants.
4. Effect of herbicides in relation to environment; herbicide resistance in weeds and crops.

**UNIT-V: Weed management** **7 Hrs.**

1. Weed management in major crops and cropping systems; weed shifts in cropping systems.
2. Control of weeds in non-cropped situations including grasslands, pastures, tea gardens, orchards and aquatic ecosystem in hills.
3. Cost:benefit analysis of weed management, weed indices.

**III. Reference books:**

1. Zimdahl, R. L. (2007) "Weed Management for Sustainable Agriculture." Academic Press, San Diego, CA.
2. Norsworthy, J. K., et al. (2012) "Weed Science: Principles and Practices." John Wiley & Sons, Hoboken, NJ.
3. Duke, S. O. (2012) "Weed Biology and Control." Springer, New York, NY.
4. Radosevich, S. R., et al. (2007) "Weed Ecology: Implications for Management." John Wiley & Sons, Hoboken, NJ.

**IV. Practical**

1. Identification of important weeds of different crops.
2. Preparation of a weed herbarium, weed survey in crops and cropping systems
3. Crop-weed competition studies, calculation of doses of herbicides and preparation of spray

solutions of herbicides for high and low volume sprayers.

4. Use of various types of spray pumps and nozzles, their calibration and related calculations and economics of weed control.



**Agri-E2**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**  
**III B.Sc., - SEMESTER- V: Agriculture Core Course Syllabus**  
**7C: Water Management**

**I. Learning Outcomes:** Students at the successful completion of the course will be able to:

1. Explain the various sources of water and its quality parameters for agriculture.
2. Differentiate between various irrigation methods and select appropriate irrigation techniques based on crop type.
3. Propose and implement water conservation practices in agriculture.
4. Communicate water management principles effectively to diverse stakeholders.

**II. Syllabus:**

**UNIT-I: Water resources for agriculture**

**8 Hrs.**

1. Water and its role in plants, water resources of India,
2. Major irrigation projects, extent of irrigated area under different crops in India.
3. Major irrigation projects, extent of irrigated area under different crops in Andhra Pradesh.

**UNIT-II: Crop responses for water stress**

**8 Hrs.**

1. Concept of water potential, water movement in soils and plants, transpiration,
2. Soilwater-plant relationships, water absorption by plants,
3. Crop plants response to water stress.
4. Crop plant adaptation to moisture stress condition.

**UNIT-III: Irrigation methods**

**10 Hrs.**

1. Soil, plant and meteorological factors determining water needs of crops,
2. Scheduling of irrigation, depth and methods of irrigation,
3. Micro-irrigation systems, fertigation
4. Management of water in controlled environment and polyhouses.

**UNIT-IV: Water management practices**

**10 Hrs.**

1. Water management in crops and cropping systems.
2. Quality of irrigation water and management of saline water for irrigation,
3. Water use efficiency and practices to enhance water productivity.
4. Excess of soil water and plant growth; water management in problem soils.
5. Drainage requirement of crops and methods of field drainage, their layout and spacing.

**UNIT-V: Climate change – water management**

**9 Hrs.**

1. Impact of climate change on water resources
2. Adaptive strategies for changing climate conditions
3. Resilient agricultural practices; Involving local communities in water management
4. Participatory approaches; Social and economic implications

**III. Reference books:**

1. M. Thangarajan, K. S. Subramanian, and V. P. Singh (2017) Sustainable Water Management in Agriculture, Springer
2. M. A. Payne, and P. W. Parolin (1994) Irrigation - Principles and Practices, Prentice Hall, New Jersey, USA
3. David Molden (ed.) (2007) Water for Food, Water for Life: A Comprehensive Assessment of Water Management in Agriculture, Earthscan, London
4. M. D. Jenkins, C. A. B. Smith, and J. A. Allan (1991) Water, Agriculture, and Sustainable Well-Being, Cambridge University Press, Cambridge

**IV. Practical:**

1. Measurement of soil water potential by using tensiometer, resistance block and pressure plate and membrane apparatus
2. Soil-moisture characteristics curves
3. Determination of FC and PWP

4. Water flow measurements using different devices.
5. Determination of infiltration rate and irrigation requirements
6. Calculation of irrigation efficiency
7. Determination of saturated hydraulic conductivity

**Agri-E1**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**  
**III B.Sc., - SEMESTER- V: Agriculture Core Course Syllabus**  
**6D: Soil Fertility and Nutrient Management**

**I. Learning Outcomes:**

- Identify and describe key soil properties influencing fertility.
- Interpret soil test results to assess nutrient levels and make informed recommendations for nutrient management.
- Understand the nutrient requirements of specific crops.
- Propose corrective actions for nutrient-related issues.

**II. Syllabus:**

**UNIT-I: Basic concepts of soil fertility** **10 Hrs.**

1. Soil fertility and productivity- factors affecting, features of a good soil management.
2. Problems of supply and factors affecting availability of nutrients, relation between nutrient supply and crop growth; organic farming - basic concepts and definitions.
3. Criteria of essentiality of nutrients, essential plant nutrients – their functions and deficiency Symptoms.
4. Transformation and dynamics of major plant nutrients in soil.

**UNIT-II: Manures** **8 Hrs.**

1. Preparation and use of farmyard manure, compost, green manures.
2. Vermicompost, biofertilizers and other organic concentrates; their composition, availability and crop responses.
3. Recycling of organic wastes and residue management.

**UNIT-III: Fertilizers** **10 Hrs.**

1. Commercial fertilizers, composition, relative fertilizer value and cost.
2. Crop response to different nutrients, residual effects and fertilizer use efficiency.
3. Fertilizer mixtures and grades, agronomic, chemical and physiological methods of estimating.
4. Techniques of increasing fertilizer use efficiency, nutrient interactions.

**UNIT-IV: Application of fertilizers** **10 Hrs.**

1. Time and methods of manures and fertilizers application; foliar application and its concept.
2. Relative performance of organic and inorganic manures.
3. Economics of fertilizer use, concept of balanced nutrition and integrated nutrient Management.
5. Use of vermicompost and residue wastes in crops.

**UNIT-V: Precision agriculture** **7 Hrs.**

1. Use of technology for precise nutrient application.
2. Sustainable practices to enhance nutrient cycling.
3. Mitigating nutrient runoff and leaching.
4. Balancing nutrient needs with environmental stewardship

**III. Reference books:**

1. Brady, N. C., & Weil, R. R. (2016). "The Nature and Properties of Soils." Pearson. New Jersey, USA.
2. Havlin, J. L., Beaton, J. D., Tisdale, S. L., & Nelson, W. L. (2014). "Soil Fertility and Fertilizers: An Introduction to Nutrient Management." Pearson. New Jersey, USA.
3. Tisdale, S. L., Nelson, W. L., Beaton, J. D., & Havlin, J. L. (1993). "Soil Fertility and Fertilizers." Macmillan Publishing Company. New York, USA.
4. Bolland, M. D. A. (1994). "Understanding the Soil System: A Basic Guide to Soil Management for Sustainable Agriculture." Food and Agriculture Organization of the United Nations. Rome, Italy.

#### **IV. Practical**

1. Identification of nutrients deficiency symptoms.
2. Determination of soil pH, EC and organic Carbon.
3. Determination of available N, P, K and S in soils.
4. Determination of total N, P, K and S in plants
5. Interpretation of interaction effects and computation of economic and yield optima.

**Agri-E2**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**  
**III B.Sc., - SEMESTER- V: Agriculture Core Course Syllabus**  
**7D: Biopesticides and Biofertilizers**

**I. Learning Outcomes:**

- Identify various types of biopesticides and explain their modes of action.
- Analyze the factors influencing the efficacy of biopesticides.
- Discuss about biofertilizers and explain their role in sustainable agriculture.
- Perform practical skills in preparing and applying bio-based products.

**II. Syllabus:**

**UNIT-I: Introduction to Biopesticides**

**10 Hrs.**

1. Definitions, concepts and classification of biopesticides viz. pathogen; botanical pesticides, and biorationales; Botanicals and their uses.
2. Mass production technology of bio-pesticides.
3. Virulence, pathogenicity and symptoms of entomopathogenic pathogens and nematodes.

**UNIT-II: Application of Biopesticides**

**8 Hrs.**

1. Methods of application of biopesticides.
2. Methods of quality control and Techniques of biopesticides.
3. Impediments and limitation in production and use of biopesticide.

**UNIT-III: Introduction to Biofertilizers**

**10 Hrs.**

1. Biofertilizers - Introduction, status and scope.
2. Structure and characteristic features of bacterial biofertilizers- *Azospirillum*, *Azotobacter*, *Bacillus*, *Pseudomonas*, *Rhizobium* and *Frankia*.
3. Cynobacterial biofertilizers- *Anabaena*, *Nostoc*, *Hapalosiphon*.
4. Fungal biofertilizers- AM mycorrhiza and ectomycorrhiza.

**UNIT-IV: Nitrogen fixation**

**10 Hrs.**

1. Nitrogen fixation - living and symbiotic nitrogen fixation.
2. Mechanism of phosphate solubilization and phosphate mobilization; K solubilization.
3. Production technology: Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid biofertilizers.

**UNIT-V: Application of Biofertilizers**

**7 Hrs.**

1. FCO specifications and quality control of biofertilizers.
2. Application technology for seeds, seedlings, tubers, sets etc.
3. Biofertilizers -Storage, shelf life, quality control and marketing.
4. Factors influencing the efficacy of biofertilizers.

**III. References:**

- H. B. Singh, H. S. Chaube, Nandita Singh (2013) Handbook of Biofertilizers and Biopesticides, CRC Press
- Opende Koul, Gadi V. P. Reddy, George W. Cuperus (2001) Biopesticides: State of the Art and Future Opportunities, CABI
- B. S. Bisht, R. K. Gaur, J. S. Sharma (2004) Biofertilizers: A Manual on Commercial Production Daya Publishing House, New Delhi
- Pankaj Sharma, Shashi K. Sharma, Asha Sharma (2010) Biofertilizers: Technology, Production and Application, Springer, Dordrecht, Netherlands

**IV. Practical:**

1. Isolation and purification of important biopesticides: *Trichoderma* *Pseudomonas*, *Bacillus*, *Metarhizium* etc. and its production.
3. Identification of important botanicals.
4. Visit to biopesticide laboratory in nearby area.
5. Field visit to explore naturally infected cadavers. Identification of entomopathogenic

entities in field condition.

6. Quality control of biopesticides.

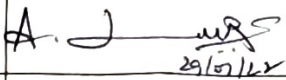
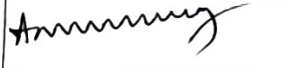
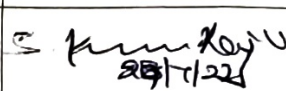
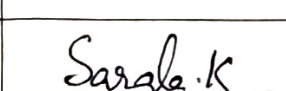
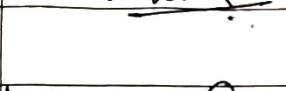
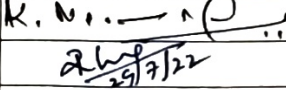
7. Isolation and purification of Azospirillum , Azotobacter, Rhizobium, P-solubilizers and cyanobacteria.

9. Mass multiplication and inoculums production of biofertilizers. Isolation of AM

**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY  
DEPARTMENT OF BOTANY**

**BOARD OF STUDIES MEETING FOR B.Sc., (B.C. Agriculture): 2022-23 A.Y.**

The Board Of Studies Meeting for the courses of **B.Sc., (AGRICULTURE)** is convened at Department of Botany, G.C. (A), Rajahmundry on **29-07-2022** by **02:00 PM** under the Chairmanship of Dr. A. Srinivasa Rao with the following members.

S.No.	Designation	Name	Signature
1.	<b>Chairman</b>	Dr. A. Srinivasa Rao Lecturer in-Charge, Department of Botany	 29/07/22
2.	<b>University Nominee</b>	Dr. A. Matta Reddy, Associate Professor, ANUR, Rajahmundry	
3.	<b>Subject Expert</b>	Dr. S. Krishnam Raju, Professor, Agricultural College (ANGRAU), Rajahmundry	 29/7/22
4.	<b>Subject Expert</b>	Dr. K. Sarala, Senior Scientist, C.T.R.I., Rajahmundry	 Sarala.K
5.	<b>Industrial Nominee</b>	Dr. P. Rama Krishna, Director, Sri Satyadeva Nursery, Kadiapulanka.	
6.	<b>Faculty Member</b>	K. Nagendra Prasad, Lecturer in Botany	 K.N.P.
7.	<b>Faculty Member</b>	Dr. R. Venkatesh, Lecturer in Botany	 29/7/22
8.	<b>Student Nominee</b>	Meenakshi Ravva, I B.C.A.	
9.	<b>Student Nominee</b>	Singampalli Samuel Raju, I B.C.A.	

  
**CHAIRMAN,  
BOARD OF STUDIES**

**BOARD OF STUDIES MEETING FOR B. Sc., (AGRICULTURE): 2022-23 A.Y.**

The Board Of Studies Meeting for the courses of **B. Sc., (Agriculture)** is convened at Department of Botany, G.C. (A), Rajahmundry on **29-07-2022** by **02:00 PM** under the Chairmanship of Dr. A. Srinivasa Rao, Lecturer In-Charge of the department.

**Agenda:**

1. Program wise Curriculum Design for all the Semesters
2. Designing of Course Outcomes and Course Objectives
3. Identification of unit wise assignment questions and relevant model question paper.
4. Identifying /inclusion of components of Skill Development, Employability and Entrepreneurship in the course content and specific activity proposed.
5. Additional inputs into the curriculum
6. Designing Model Question Papers and identifying potential paper setters
7. Innovative Teaching - Learning Methodology (Learner Centric)
8. Academic activities of the Department such as seminars, fieldworks etc.
9. Eligibility for admission in to B.Sc. (Botany, Chemistry and Agriculture)
10. Any other proposal with the permission of the chair

**Minutes of the Meeting:**

**Agenda point 1: Program wise Curriculum Design for all the Semesters**

**Discussion:** The members discussed the curricular design of the B.Sc., (Agriculture) programme with one course of Agriculture in each semester to instil a comprehensive awareness of the domain area.

**Resolution:** The design of the programme with combination of Botany, Chemistry and Agriculture courses offered in all the semesters (I to V) are unanimously approved by all the members of the BOS concerned.

**Agenda point 2: Designing of Course Outcomes and Course Objectives**

**Discussion:** The members who attended the meeting have gone through the course outcomes and course objectives related to the Agriculture core courses pertaining to all the semesters and discussed in detail.

**Resolution:** The outcomes and objectives written as per the Bloom's taxonomy are well appreciated and accepted unanimously.

**Agenda point 3: Identification of unit wise assignment questions and relevant model question paper.**

**Discussion:** Members who attended the meeting have read the assignment questions and discussed their relevance to the course curriculum with the teachers dealing with the said core courses.

S. K. Srinivasa Rao  
29/7/22

Anu

K. N. S. — NP

Sarala.K

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29/7/2022



**Resolution:** The assignment questions given for each course are accepted by the BOS members.

**Agenda point 4: Identifying /inclusion of components of Skill Development, Employability and Entrepreneurship in the course content and specific activity proposed.**

**Discussion:** As the Agriculture is a skill based subject. Moreover, the students pursuing the programme have to compete with the students from Agriculture Colleges affiliated to ICAR for vertical mobility, employment and entrepreneurship. Hence a dire need is felt to impart more skill based trainings to the students.

**Resolution:** The committee unanimously resolved to train the students by inviting experts in the domain subject and by conducting skill based trainings and field visits to Agriculture firms in public and private sectors.

**Agenda point 5: Additional inputs into the curriculum**

**Discussion:** The additional inputs kept in the curriculum in the form of co-curricular and outreach programmes are well appreciated by all the members of BOS.

**Resolution:** All the additional inputs related to core subject are accepted by the BOS members.

**Agenda point 6: Designing Model Question Papers and identifying potential paper setters**

**Discussion:** The members of BOS gone through the model question papers of all the courses and proposed names of question papers setters and evaluators and discussed the relevance and competencies.

**Resolution:** The model question papers, names of question paper setters and evaluators are unanimously accepted by the members of BOS.

**Agenda point 7: Innovative Teaching - Learning Methodology (Learner Centric)**

**Discussion:** As the Agriculture is a skill based subject, all the students pursuing the programme should have field based knowledge and have to do more case studies related to agriculture crops to get a thorough skills in the domain area. Hence all the members felt the need of internships for the students in agriculture fields and agro based industries.

**Resolution:** It is unanimously resolved to impart skill based trainings to students in consultation with higher authorities and by linkages and collaborations with the Agriculture based firms and industries.

**Agenda point 8: Academic activities of the Department such as seminars, fieldworks etc.**

**Discussion:** The members who have attended the BOS meeting discussed the annual action plan prepared by the department and the activities planned. The members felt the importance of tours and industrial visits to get an exposure to recent trends in the domain area.

**Resolution:** It is unanimously resolved to conduct one tour/field trip to Agriculture university/college/research institute and also an agro based industry in both the semesters of an Academic Year.

K. N. S. — NP

S. V. R. Raju  
29/7/22  
Am

Sarela. K

29/7/2022

**Agenda point 9: Eligibility for admission in to B.Sc. (Botany, Chemistry and Agriculture)**

**Discussion:** The faculty members of the department informed that students from groups other than Bi.P.C./domain related areas were opted and admitted in to the programme during the previous academic year. This point is discussed at length and all the BOS members. All of them felt that basic knowledge and a good foundation in domain related subjects at +2 level is a must to study the B.Sc., (B.C.A.) programme. All the members felt to specify the eligibility for admission during online admission, as this programme is not coming under the category of B.Voc.,

**Resolution:** A unanimous resolution is passed in this BOS to request the authorities of APCCE, APSCHE and Adikavi Nannaya University to fix eligibility for admission into B.Sc., (B.C.Agriculture) programme. The eligibility for admission must be Bi.P.C. or vocational courses related to agriculture (Crop Production; Seed Technology etc.,) in Intermediate. Further students who have completed +2 (Diploma) from Agriculture and Horticulture colleges can also be admitted. Members felt a need to have a strict resolution in this matter.

S. Kumar Roy  
29/7/22

Sarala K

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29/7/2022

K. N. S. P

**BOARD OF STUDIES MEETING FOR B. Sc.. (AGRICULTURE): 2022-23 A.Y.**

The Board Of Studies Meeting for the courses of **B. Sc., (Agriculture)** is convened at Department of Botany, G.C. (A), Rajahmundry on **29-07-2022** by **02:00 PM** under the Chairmanship of Dr. A. Srinivasa Rao, Lecturer In-Charge of the department.

**Agenda:**

1. Program wise Curriculum Design for all the Semesters
2. Designing of Course Outcomes and Course Objectives
3. Identification of unit wise assignment questions and relevant model question paper.
4. Identifying /inclusion of components of Skill Development, Employability and Entrepreneurship in the course content and specific activity proposed.
5. Additional inputs into the curriculum
6. Designing Model Question Papers and identifying potential paper setters
7. Innovative Teaching - Learning Methodology (Learner Centric)
8. Academic activities of the Department such as seminars, fieldworks etc.
9. Eligibility for admission in to B.Sc. (Botany, Chemistry and Agriculture)
10. Any other proposal with the permission of the chair

**Minutes of the Meeting:**

**Agenda point 1: Program wise Curriculum Design for all the Semesters**

**Discussion:** The members discussed the curricular design of the B.Sc., (Agriculture) programme with one course of Agriculture in each semester to instil a comprehensive awareness of the domain area.

**Resolution:** The design of the programme with combination of Botany, Chemistry and Agriculture courses offered in all the semesters (I to V) are unanimously approved by all the members of the BOS concerned.

**Agenda point 2: Designing of Course Outcomes and Course Objectives**

**Discussion:** The members who attended the meeting have gone through the course outcomes and course objectives related to the Agriculture core courses pertaining to all the semesters and discussed in detail.

**Resolution:** The outcomes and objectives written as per the Bloom's taxonomy are well appreciated and accepted unanimously.

**Agenda point 3: Identification of unit wise assignment questions and relevant model question paper.**

**Discussion:** Members who attended the meeting have read the assignment questions and discussed their relevance to the course curriculum with the teachers dealing with the said core courses.

*E. K. ...*  
*29/7/2022*  
*Sarala.K*  
*29/7/2022*

**Resolution:** The assignment questions given for each course are accepted by the BOS members.

**Agenda point 4: Identifying /inclusion of components of Skill Development, Employability and Entrepreneurship in the course content and specific activity proposed.**

**Discussion:** As the Agriculture is a skill based subject. Moreover, the students pursuing the programme have to compete with the students from Agriculture Colleges affiliated to ICAR for vertical mobility, employment and entrepreneurship. Hence a dire need is felt to impart more skill based trainings to the students.

**Resolution:** The committee unanimously resolved to train the students by inviting experts in the domain subject and by conducting skill based trainings and field visits to Agriculture firms in public and private sectors.

**Agenda point 5: Additional inputs into the curriculum**

**Discussion:** The additional inputs kept in the curriculum in the form of co-curricular and outreach programmes are well appreciated by all the members of BOS.

**Resolution:** All the additional inputs related to core subject are accepted by the BOS members.

**Agenda point 6: Designing Model Question Papers and identifying potential paper setters**

**Discussion:** The members of BOS gone through the model question papers of all the courses and proposed names of question papers setters and evaluators and discussed the relevance and competencies.

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**Agenda point 7: Innovative Teaching - Learning Methodology (Learner Centric)**

**Discussion:** As the Agriculture is a skill based subject, all the students pursuing the programme should have field based knowledge and have to do more case studies related to agriculture crops to get a thorough skills in the domain area. Hence all the members felt the need of internships for the students in agriculture fields and agro based industries.

**Resolution:** It is unanimously resolved to impart skill based trainings to students in consultation with higher authorities and by linkages and collaborations with the Agriculture based firms and industries.

**Agenda point 8: Academic activities of the Department such as seminars, fieldworks etc.**

**Discussion:** The members who have attended the BOS meeting discussed the annual action plan prepared by the department and the activities planned. The members felt the importance of tours and industrial visits to get an exposure to recent trends in the domain area.

**Resolution:** It is unanimously resolved to conduct one tour/field trip to Agriculture university/college/research institute and also an agro based industry in both the semesters of an Academic Year.

S. K. ...  
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29/12/2022

Sarada.K

K. N. ...

**Agenda point 9: Eligibility for admission in to B.Sc. (Botany, Chemistry and Agriculture)**

**Discussion:** The faculty members of the department informed that students from groups other than Bi.P.C./domain related areas were opted and admitted in to the programme during the previous academic year. This point is discussed at length and all the BOS members. All of them felt that basic knowledge and a good foundation in domain related subjects at +2 level is a must to study the B.Sc., (B.C.A.) programme. All the members felt to specify the eligibility for admission during online admission, as this programme is not coming under the category of B.Voc.,

**Resolution:** A unanimous resolution is passed in this BOS to request the authorities of APCCE, APSCHE and Adikavi Nannaya University to fix eligibility for admission into B.Sc., (B.C.Agriculture) programme. The eligibility for admission must be Bi.P.C. or vocational courses related to agriculture (Crop Production; Seed Technology etc.) in Intermediate. Further students who have completed +2 (Diploma) from Agriculture and Horticulture colleges can also be admitted. Members felt a need to have a strict resolution in this matter.

S. V. K. K. K. K. K.  
29/7/22

Sarala.K

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29/7/2022

K. N. S. P.