ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.Sc(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

I SEMESTER **SKILL ENHANCEMENT** Time: 3hrs/week

AGBT 101(2) **PLANT BIOCHEMISTRY & BIOTECHNOLOGY** Marks:50

PRACTICAL SYLLABUS

OBJECTIVES:

- To identify importance of biochemistry in plant sciences
- To explain about application of biotechnology
- To identify the various classifications and structures of biochemical elements

Course Outcomes

At the end of the course, students will be able to

CO1: To discuss about the classifications and functions of carbohydrates.
CO2: To know about the nucleic acids and types of nucleocides DNA nd RNA.
CO3: To know about the applications of plant tissue culture and its applications.
CO4: To discuss Tricarboxylic Acid (TCA) cycle

UNIT – I: **(4Hrs.)**

1. Introduction – Historical aspects of Biochemistry– Scope, impact and importance of Biochemistry in plant sciences -Properties of water – PH – Buffers.
2. Carbohydrates– Classification - Structures – Monosacharides – Structural aspects
3. mutarotation - Reducing and oxidizing properties.
4. Oligosaccharides and polysaccharides-Functions of carbohydrates
5. Lipids – Fatty acids – Structures and properties – Functions of lipids-Lipid Classification –
6. Amino acids – Structures - Classification – Zwitterions – Titration -Peptides –

UNIT – II: **(4Hrs.)**

1. Proteins –Importance - Classification - Properties of proteins –Isoelectric PH – Denaturation - Protein sequencing – Edman degradation method
2. Proteins – Structural organization – Primary, secondary, tertiary and quaternary structures and forces involved in stabilizing proteins
3. Enzymes – Characteristics of enzymes – Chemical nature, speed, specificity, active site - activation energy .
4. Classification of enzymes
5. Factors affecting enzyme activity – Enzyme Inhibition – MM & LB plots

UNIT – III:

1. Nucleic acids – Functions – Structures of nitrogen bases – Nucleosides – Nucleotides in RNA and DNA **(4Hrs.)**
2. Various types of DNA and RNA – Secondary structure of B-DNA and t-RNA.
3. Metabolism – Anabolism and Catabolism – Stages of respiration – Overall metabolic view of carbohydrates, proteins and lipids.
4. Paper electrophoresis for separation of plant pigments
5. Paper model of protein – protein estimation by Lowry method
6. Extraction of DNA from onion – test for DNA
7. Column chromatography of RNA hydrolysate

UNIT – IV: **(4Hrs.)**

1. Biotechnology – Major – Concepts and importance – Applications of plant biotechnology.
2. Requirements for plant tissue culture laboratory
3. Techniques in plant tissue culture
4. Media components and preparations
5. Sterilization techniques and inoculation of various explants
6. Aseptic manipulation of various explants

7. Micropropagation of important crops
8. Anther culture – callus induction and plant regeneration

UNIT – V: **(4Hrs.)**

1. Embryo and endosperm culture – callus induction and plant regeneration
2. Hardening / acclimatization of regenerated plants
3. Somatic embryogenesis and synthetic seed production
4. Isolation and culturing of protoplast
5. Plant genomic DNA isolation
6. Gel-electrophoresis technique / southern blotting
7. Direct gene transfer technique
8. Indirect gene transfer technique
9. Confirmation of genetic transformation

References Text Books:

1. David L. Nelson, Michael M.Cox; W.H. Freeman.Lehninger Principles of Biochemistry, 6th Edition
2. Biochemistry, Dr.U.Satyanarayana, Dr.U. Chakrapani, Books and Allied(P) Ltd, Kolkata
3. Biochemistry, S.N.Gupta, Rastogi Publications, First Edition, 2011
4. Introduction to Plant Biotechnology by HS Chawla (3rd Edition), Oxford & IBH Publishing Co. Pvt Ltd., New Delhi

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.Sc(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

I SEMESTER **AGRICULTURE & RURAL DEVELOPMENT** Time:3hrs/week

AGRD 101(1) **FUNDAMENTALS OF AGRONOMY** Marks:50

PRACTICAL SYLLABUS

OBJECTIVES:

• To identify the various tillage implements.

• To explain the cultivation of rice crop.

• To identify the various herbicides available in India.

Course Outcomes:

CO1: Analyze the crop production techniques and crop growth in relation to the environment.

CO2: Describe the Zero and minimum tillage: their basics and application.

CO3: Explain Precision agriculture and Precision farming, their concepts and application.

EXPERIMENTS:

1. Study of tillage Implements: Fields. **(2 Hrs.)**
2. Practice of puddling: Fields. **(4 Hrs.)**
3. Study of seeding equipment – different methods of sowing: Fields. **(4 Hrs.)**
4. Study of manures, fertilizers and green manure crops / seeds. **(4 Hrs.)**
5. Study of inter-cultivation implements and practice. **(4 Hrs.)**
6. Herbarium preparation of weeds. **(4 Hrs.)**
7. Field tours: Water reservoir: **(8 Hrs.)**
    1. Krishna
2. Pattiseema Project (Polavaram)
3. Godavari

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

I SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time: 30hrs/week

AGRD101(2) **FUNDAMENTALS OF AGRONOMY** Marks:100

OBJECTIVES:

- To identify the various tillage implements.
- To explain about cultivation of rice crop.
- To identify the various herbicides available in India.

Course Outcomes

At the end of the course, students will be able to

CO1: Explain the history and development of agriculture in India.

CO2: Explain crop production techniques and crop growth in relation to the environment.

CO3: Outline the principles and practices of weed management.

CO4: Discuss the classification, nomenclature, mode of action and selectivity of herbicides.

CO5: Compare the traditional and technology-supported practices in agriculture.

UNIT – I: **(6Hrs.)**

1. Definition of agriculture – meaning and scope of agronomy
2. History and development of agriculture in ancient India – agriculture in civilization era
3. National and International Agricultural Research Institutes in India
4. Agro-climatic zones of India – soils, land use pattern, major sources of irrigation and ground water potential
5. Agro-climatic zones of Andhra Pradesh – soils, land use pattern, major sources of irrigation and ground water potential
6. Tillage and tilth – objectives of tillage – characteristics of ideal seed bed – effect of tillage on soil properties – pore space, texture, structure, bulk density and color of the soil

UNIT – II:
(6Hrs.)

1. Types of tillage – preparatory tillage – factors affecting preparatory cultivation, after cultivation, puddling
2. Sowing – methods of sowing – time and depth of sowing for major agricultural crops – cereals, pulses and oilseeds
3. Crop stand establishment – factors affecting optimum stand establishment
4. Planting geometry – competition – types of competition, intra and inter plant competition – plant population – effect of plant population on growth and yield – optimum plant density and planting pattern
5. Soil fertility – soil fertility and soil productivity – fertility losses – maintenance of soil fertility – soil organic matter

6. Weed control – definition of weed – losses and uses of weeds – weed influence on crop production – methods of wed control

UNIT – III: (6Hrs.)

1. Irrigation management – importance of irrigation – objectives of irrigation – methods of irrigation – drainage and its advantages

2. Cropping systems – monocropping – definition and principles of crop rotation – mixed cropping – intercropping – relay cropping – multistoried cropping – sole cropping and sequence cropping

3. Harvest maturity symptoms and harvesting of major agricultural crops – rice, maize, groundnut, sugarcane and pulses – maturity indices, method of harvesting, threshing and winnowing – harvest index

4. Introduction - weed definition - harmful and beneficial effects of weeds

5. Classification of weeds – classification based on morphology – life cycle – habitat – origin –association – special features and soil pH with examples.

6. Propagation of weeds – sexual – asexual – vegetative reproduction – dispersal of weed seeds and fruits – dispersal agents – wind and water – animal – man – manures –farm implements and silage – dispersal of vegetative propagules

UNIT – IV: (6Hrs.)

1. Weed Biology – characteristic features of weeds – weed ecology – definition – persistence of weeds climatic – edaphic and biotic factors – crop weed association with some important crops like rice, maize, wheat, jowar, pulses, groundnut, sugarcane, cotton and tobacco.

2. Crop -weed competition - principles – factors - critical period of crop-weed competition - allelopathy.

3. Methods of weed management – preventive weed control measures – physical / mechanical, cultural,

4. Chemical and biological methods of weed control – bioherbicides - integrated weed management

5. Herbicides – definition - advantages and limitations of herbicide usage in India- classification of herbicides based on chemical nature - time and method of application

6. Classes of herbicides based on – selectivity – spectrum – translocation – residual nature – soil sterilants and fumigants – types of formulations.

7. Nomenclature of herbicides - commonly available herbicides in India – adjuvants - definition, their use in herbicides application. - surfactants - stabilizing agents - solvents - humificants - stickers - activators - compatibility agents - drift control agents etc.

UNIT – V: (6Hrs.)

1. Mode of action of herbicides – important biochemical modes of action of herbicides inter fearing with photosynthetic reactions – respiration –enzymatic inhibition etc – effects of sub lethal doses of herbicides on plants

2. Selectivity of herbicides – fundamental principles of selectivity – differential rate of absorption - differences in morphology and growth habit of plants – rate of translocation.

3. Selectivity of herbicides – differential rate of deactivation of herbicides – metabolism – reverse metabolism – conjugation – protoplasmic resistance to the specific herbicide

4. Weed management in different crops and cropping systems – rice – nursery – upland rice – low land rice – wheat – sorghum – maize – red gram – black gram – groundnut – sunflower.

5. Weed management in different crops and cropping systems – sugarcane – cotton – tobacco, Vegetables (tomato, onion, chilli and brinjal) and Orchards (mango, banana and citrus).

6. Our Journey in Agriculture and Vision for the Future

7. Traditional and Technically knowledge of agricultural crops

References Text Books:

- Yellamanda Reddy, T. and Sankara Reddy, G.H. 2010. Principles of Agronomy.Kalyani Publishers, Ludhiana.
- Crafts, A.S. and Robbins, W.W. 1973. Weed Control. *Tata McGraw-Hill Publishing Co. Ltd*.,New Delhi.
- Gupta, O.P. 1984. Scientific Weed Management. Today and Tomorrow Printers and Publishers, New Delhi.
- Gupta, O.P. 2004. Modern Weed Management. Agro Bios (India), Jodhpur.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

I SEMESTER **SKILL ENHANCEMENT SYLLABUS** Time: 2hrs/week

AGRD102(2) **AGRICULTURE INFORMATICS** Marks:50

PRACTICAL SYLLABUS

OBJECTIVES:

- To create, capture, access and disseminate information to achieve a more productive and sustainable.
- To use of agricultural resources.
- To encourage non-profit, research professionals and business professionals.

Course Outcomes:

CO1: Explain Windows explorer- Creating folder - Copy and paste functions - Control panel Notepad -WordPad etc.

CO2: Summarize MS word - Creating a document, saving and editing

CO3: Discuss Use of options from tool bars – Format - Insert and tools (Spelling and Grammar) - Alignment of paragraphs and text.

CO4: Explain to Creating a table - Merging of cells - columns and row width - Formats etc.

UNIT – I: **(4 Hrs.)**

1. Introduction to computers- Advantages- Disadvantages- Applications - Anatomy of Computers- Input / output devices -Memory Concepts - Units of Memory - RAM – ROM – PROM – EPROM - EAPROM - Cache Memory.
2. Operating system - Definition and types - WINDOWS OS – Features – Desktop – Icons etc.
3. Applications of MS-Office - MS- Word - Creating - Editing and formatting a document. 4. MS Word - Features of good word processor - Mail merge – Drop cap- Auto text.Track changes – Equation editor etc.

UNIT – II: **(4 Hrs.)**

4. MS- Excel - Data presentation, Tabulation – Merging of cells and graph creation - Mathematical expressions.
5. MS- Excel - Data analysis tool pack – Pivot table and graph etc.
6. MS Access – Database - concepts and types - creating database - Uses of DBMS in agriculture.

UNIT – III: **(4 Hrs.)**

1. MS Access - Objects of data base – Types of fields etc.
2. Internet and World Wide Web (WWW) – Concepts - Components and creation of web.
3. HTML - XML coding.

UNIT – IV: **(4 Hrs.)**

1. e-Agriculture - Concepts - Design and development - Application of innovative ways to use information and communication technologies (IT) in Agriculture.
2. ICT for Data Collection - Formation of development programmes - Monitoring and evaluation of Programmes - Computer Models in Agriculture statistical weather analysis and crop simulation models – Concepts – Structure - Inputsoutputs files – Limitation - Advantages and application of models for understanding plant processes – Sensitivity – Verification - Calibration and validation.

3. IT application for computation of water and nutrient requirement of crops - Computer controlled devices (automated systems) for Agri-input management - Smartphone mobile apps in Agriculture for farm advises - Market price - Postharvest management etc.

UNIT – V: **(4 Hrs.)**

1. Geospatial technology – Concepts – Techniques - Components and uses for generating valuable agri-information.
2. Decision support systems – Taxonomy – Components – Framework - Classification and applications in Agriculture - DSS - Agriculture Information/Expert System - Soil Information Systems etc for supporting Farm decisions.
3. Preparation of contingent crop-Planning and crop calendars using IT tools.

REFERENCES:

1. John Walkenbach, Herb Tyson, Michael R. Groh, Faithe Wempen, Microsoft Office 2010 Bible.
2. Bangia,Learning Ms Office 2010.
3. Prof. Satish Jain and M. Geetha, MS-Office 2010 Training Guide.
4. Johnson, Microsoft Office 2010.....on Demand.
5. Kate Shoup, Microsoft Office 2010.
6. Melanie Gass, It's All about You! Office 2010.
7. Nancy Conner and Matthew MacDonald, Office 2010: The Missing Manual.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

I SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time: 2hrs/week

AGRD111(1) **FUNDAMENTALS OF PLANT BREEDING & GENETICS** Marks:50

PRACTICAL SYLLABUS

OBJECTIVES:

- To study Genetics in relation to plant breeding.
- To study the purpose of the cell cycle
- To study about the mendel's laws
- To study identifying the characteristics of self- and cross-pollinated crops and their breeding methodology for plants

Course Outcomes:

CO1: Discuss details of cell cycle, heredity and laws of inheritance in genetics

CO2: Outline the concepts of karyotype, sex linkage and mutations and central dogma of genetic material and genetic code.

CO3: Explain historical development, concepts, nature and role of plant breeding and modes of reproduction and the different plant breeding methods.

CO4: Summarize the development of resistance and tolerance mechanisms.

EXPERIMENTS:

1. Study of microscope. **(2Hrs.)**
2. Study of cell structure. **(2Hrs.)**
3. Practice on meiotic cell division. **(2Hrs.)**
4. Monohybrid and its modifications, Dihybrid and Trihybrid. **(4Hrs.)**
5. Test cross and back cross and their epistatic interactions. **(4 Hrs.)**
6. Study of models on DNA and RNA structure. **(4Hrs.)**
7. Plant Breeder's kit. **(2hrs)**
8. Study of germplasm of various crops. **(2hrs)**
9. Consequences of inbreeding on genetic structure of resulting populations. **(4hrs)**
10. Study of male sterility systems. **(2hrs)**

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B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

I SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time: 3hrs/week

AGRD111 (1) **FUNDAMENTALS OF PLANT BREEDING & GENETICS** Marks:100

SYLLABUS

OBJECTIVES

- To study Genetics in relation to plant breeding.
- To learn and apply concepts of modern transmission and molecular genetics.
- To study the purpose of the cell cycle
- To study about the mendel's laws
- To study identifying the characteristics of self- and cross-pollinated crops and their breeding methodology for plants.

Course Outcome

CO1: Discuss details of cell cycle, heredity and laws of inheritance in genetics

CO2: Outline the concepts of karyotype, sex linkage and mutations and central dogma of genetic material and genetic code.

CO3: Explain historical development, concepts, nature and role of plant breeding and modes of reproduction and the different plant breeding methods.

CO4: Summarize the development of resistance and tolerance mechanisms.

UNIT – I: (6hrs.)

1. Pre Mendelian concepts of heredity – Early history of heredity, inheritance of acquired traits, preformation theory, pangenesis and germplasm theory. Mendelian principles of heredity -Terminology, Mendel's Experiments-Reasons for selection of pea as experimental material characters studied - Reasons for mendel's success. Mendel's laws -Law of segregation- Law of independent assortment- Principle of dominance -Principle of unit characters- Exceptions to mendel's laws-Rediscovery of mendelian principles.
2. Chromosome and cell division - Structure of chromosome, types of chromosomes based on position of centromere. Cell division – Cell cycle – Mitosis - Process of mitosis - Significance. Meiosis - Process - Differences between mitosis and meiosis - Significance.
3. Gene interaction - Nonepistatic interaction – Interaction of factors; epistatic interactions - Complementary epistasis, dominant epistasis. Recessive epistasis, duplicate dominant gene action, dominant suppression or inhibitory gene action, duplicate genes with cumulative effect.
4. Multiple alleles – Characteristics of multiple alleles - Blood groups in humans, coat colour in rabbits, self-incompatibility alleles in plants - pleiotropism, penetrance and expressivity.
5. Linkage – Definition – Classification of linkage – Characteristic features of linkage. Linkage groups. Detection of linkage – Estimation of linkage - Importance of test cross in linkage studies significance in plant breeding.

UNIT – II: (6hrs.)

1. Chromosome mapping – point test cross – Cytological maps and genetical maps Coincidence and interference.
2. Sex determination and sex linkage - Various mechanisms of sex determination Chromosomal sex determination, genic balance mechanism of sex determination in Drosophila melanogaster, male haploidy, single gene effects etc. Sex linkage – White eye colour in Drosophila, colour blindness and haemophilia in humans - sex influenced traits – Horns in sheep, baldness in humans, sex limited - Milk production in cattle, beard in man – Pseudohermaphrodites – Gynandromorphs.
3. Qualitative and Quantitative traits, Polygenes and continuous variations - Definition - Inheritance and their differences, multiple factor hypothesis.
4.

5. Nature and structure of genetic material - DNA and its structure - Watson and Crick's model - Function – Experiments to prove DNA as genetic material. Replication of DNA-Modes of DNA replication - Semi-conservative DNA replication Experimental proof. Types of RNA - Messenger RNA, ribosomal RNA and transfer RNA - structure of tRNA, differences between DNA and RNA.
6. Transcription and translational mechanism of genetic material - Genetic code – Properties of genetic code – Wobble hypothesis.
7. Mutation - Classification - Gene mutations - Introduction - Definition - Types of mutations - Spontaneous and induced mutations - Point mutations - Characters of mutations - Xenia and metaxenia – Chimeras Types and their significance in plant breeding. Methods of inducing mutations, Physical and chemical mutagens - Detection of sex linked lethals in Drosophila (ClB method given by Muller). Molecular basis of mutations - Transitions, transversions and frame shift mutations Importance of mutations in plant breeding.

UNIT – III: (6hrs.)

1. Historical developments, concept, nature and role of plant breeding, major achievements and future prospects - Definition, aim, objectives, history and developments of plant breeding, scientific contributions of eminent scientists - Landmarks in plant breeding - Scope of plant breeding.
2. Plant introduction and Centre of Origin/Diversity - Plant introduction – Primary introduction and secondary introduction – Plant introduction agencies in India-Procedure, Merits and demerits of plant introduction. Classification of Centre of Origin/Diversity – law of homologous series – Types of centres of diversity – Germplasm collections – Genetic erosion – Main reasons of genetic erosion – Extinction - Gene sanctuaries - Introgression – Gene banks – Types of gene banks.
3. Modes of reproduction and pollination - Asexual reproduction (vegetative reproduction and apomixis) and sexual reproduction - Their classification and significance in plant breeding. Self-pollination – mechanisms promoting self-pollination – Genetic consequences of self pollination – Cross pollination – Mechanisms promoting cross pollination – Genetic consequences of cross pollination – Often cross pollinated crops.
4. Self– incompatibility and Male Sterility - Classification – Heteromorphic, homomorphic, gametophytic and sporophytic systems of incompatibility – Advantages and disadvantages – Utilization in crop improvement. Genetic consequences, cultivar options - Different types – Genetic, cytoplasmic and cytoplasmic genetic male sterility – Inheritance and maintenance– utilization of male sterile lines in hybrid seed production – Their advantages and disadvantages.
5. Breeding methods in self-pollinated crops - Modes of selection - Selection – Natural Hybridization techniques - Hybridization – Aims and objectives – Types of hybridization – Pre-requisites for hybridization – Procedure / steps involved in hybridization.

UNIT – IV: (6hrs.)

1. Mass selection and pureline selection – Procedure for evolving a variety by mass selection – Modification of mass selection – Merits, demerits and achievements. Pure line selection - Johannsen's pure line theory and its concepts and significance – Origin of variation in pure lines – Characters of pure lines – Progeny test, genetic basis of pure line selection – General procedure for evolving a variety by pure line selection – Merits, demerits and achievements – Comparison between mass and pure line selection.
2. Handling of segregating population - Pedigree method and bulk method– Procedure – Merits, demerits and achievements. Bulk method – Procedure – Merits, demerits and achievements – Comparison between pedigree and bulk methods - Single seed descent method – Merits and demerits. Backcross method of breeding–Its requirements and applications – Procedure for transfer of single dominant gene - Procedure for transfer of single recessive gene – Merits, demerits and achievements - comparison between pedigree and backcross method.
3. Multiline concept and Recurrent selection - Definition – Characteristics of a good multiline – Development of multiline varieties – Achievements. Concepts of population genetics and Hardy - Weinberg Law- Factors affecting equilibrium frequencies in random mating populations - Selection without progeny testing – Selection with progeny testing - Merits and demerits of progeny selection

– Line breeding– achievements.Recurrent selection – Different types – Detailed procedure of simple recurrent selection and other recurrent selection methods.

4. Heterosis and hybrid vigour – Luxuriance – Heterobeltiosis – Brief history– heterosis in cross pollinated and self-pollinated species – Manifestations of heterosis. Genetic basis of heterosis – Dominance, over dominance and epistasis hypotheses – Objections and their explanations – Comparison between dominance and overdominance hypothesis. Inbreeding depression - Brief history – Effects of inbreeding – Degrees of inbreeding depression – Procedure for development of inbred lines and their evaluation. Development of inbred lines and hybrids - Exploitation of heterosis – History of hybrid varieties – Important steps in production of single and double cross hybrids.
5. Composite and synthetic varieties - Production procedures – Merits, demerits and achievements – Factors determining the performance of synthetic varieties – Comparison between synthetics and composites.
6. Breeding methods in asexually propagated crops, clonal selection,hybridization and wide hybridization - Characteristics of asexually propagated crops, clones –Clonal selection – Procedure – Advantages and disadvantages – Problems in breeding asexually propagated crops – Genetic variation within a clone – Clonal degeneration – Achievements – Interspecific hybridization.
7. Polyploidy in relation to plant breeding and Mutation breeding - Polyploidy – Autopolyploids – Origin and production – Morphological and cytological features– Applications in crop improvement – Limitations– Allopolyploidy – Morphological and cytological features– Applications in crop improvement – Limitations. Mutation breeding - Methods and uses - Mutation breeding – Procedure of mutation breeding – Applications – Advantages, limitations and achievements.

UNIT-V: (6hrs.)

1. Breeding for important biotic and abiotic stresses - Disease resistance – Mechanisms of disease resistance in plants (disease escape, tolerance, resistance, immunity and hypersensitivity) – Genetic basis of disease resistance – Gene for gene hypothesis –sources of disease resistance – Breeding methods for disease resistance – Achievements.Insect resistance – Mechanism of insect resistance in plants (non preference, antibiosis, tolerance and avoidance) – Genetics of insect resistance – Horizontal and vertical resistance– Sources of insect resistance – breeding methods for insect resistance – Problems in breeding for insect resistance – Achievements.
2. Drought resistance, salt tolerance and cold tolerance – Mechanisms of drought resistance (drought escape, avoidance, tolerance, and resistance) – Features- Sources of drought resistance – Breeding methods for drought resistance – Limitations – achievements. Salt tolerance – Response of plants to salinity – Symptoms – Mechanisms of salt tolerance – Breeding methods for salt tolerance – Problems – Achievements. Cold tolerance – Chilling resistance – Effects of chilling stress on plants – Mechanism of chilling tolerance – Sources of chilling tolerance – Selection criteria.
3. Biotechnological tools - DNA markers and marker assisted selection - Definition and classification of DNA markers and applications.

References Text Books:

Phundan Singh, 2014. Essentials of Plant Breeding. Kalyani Publishers, New Delhi. Singh, B.D. 2015. Plant Breeding: Principles and Methods. Kalyani Publishers, New Delhi. Gupta, S.K. 2010. Plant Breeding Theory and Techniques.Wiley India Pvt. Ltd. New Delhi. Allard, R.W. 2010. Principles of Plant Breeding. John Wiley and Sons, New York.

Poehlman, J.M. and Borthakur, D. 1995. Breeding of Asian Field Crops. Oxford and IBH Publishing Co., New Delhi.

Sharma, J.R. 1994. Principles and Practice of Plant Breeding.Tata McGraw Hill, Publishing Company Ltd., New Delhi.

Pundhan Singh. 2006. Genetics. Kalyani Publishers, Ludhiana.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

I SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time: 3hrs/week

AGRD119(4) **RURAL DEVELOPMENT IN INDIA** Marks:100

SYLLABUS

OBJECTIVES:

- To learn the importance of rural sociology in agricultural extension.
- To learn Rural development and leadership programmes .
- To learn to implement the Panchayats for Rural Development.
- To learn principles of Agriculture and Rural Development .

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: Explain the relevance of rural sociology in agricultural extension, characteristics of rural society, classification and stratification of social groups.

CO2: Outline Rural development and leadership programmes

CO3: Summarize the meaning, scope and importance of self employments and Entrepreneurship

CO4: Explain meaning, definition and steps of extension teaching and risk benefit analysis.

CO5: Summarize thePanchayats for Rural Development

UNIT – I: **(6Hrs.)**

1. Sociology and rural sociology, extension education, agricultural extension - meaning and definitions
2. Socio Economic Structure of Rural Development
3. Characteristics of Indian, rural society - differences and relationships between rural and urban societies
4. Rural development: An Overview
5. Rural Poverty

UNIT – II: **(6Hrs.)**

1. Meaning and Content of Rural Development
2. National program of Rural Development
3. Leadership - meaning - classification of leaders - roles of a leader and different methods in selection of a leader
4. Training of leaders - lay and professional leaders - advantages and limitations in using local leaders in agricultural extension
5. Issues in Rural development

UNIT-III **(6Hrs.)**

1. Employment Guarantee scheme
2. Self employment and Entrepreneurship Development
3. National Social Assistance Programme
4. Rural water supply

UNIT-IV: **(6Hrs.)**

1. Agriculture and Rural Development
2. Modern agricultural Technology
3. Rural Industrialisation
4. Energy management

UNIT-V: **(6Hrs.)**

1. social forestry
2. the national bank for Agriculture and Rural Development
3. Rural management
4. Training for Rural people
5. Panchayats for Rural Development

References Text Books:

- Rural Development in India author : Vasant Desai
- Adivi Reddy, A. 2001. Extension Education. Sri Lakshmi Press, Bapatla.
- Divadeenam, P. 2002. Educational Psychology in Agriculture. Agrotech Publishing Academy, Udaipur.
- Mangal, S.K. 2000. Educational Psychology. Prakash Brothers, Ludhiana.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

I SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time: 3hrs/week

AGRD141 (2) **AGRICULTURAL ECONOMICS** Marks:50

SYLLABUS

OBJECTIVES:

- To analyse Agricultural Crop Price determination.
- To analyse the Market Structures.
- To analyse the practices followed in Agriculture.

Course Outcomes:

CO1: Apply concepts and terms of economics to the agricultural sector.

CO2: Explain characteristics of wealth, welfare, needs and surplus and laws of marginal utility.

CO3: Outline different aspects of demand and supply, essentials of market, pricing and competition.

CO4: Summarize the concepts of national income, classification and cannons of taxation, features of public and private finance, sources of public revenue and public expenditure, concepts of inflation, types, causes and control of inflation.

UNIT – I: (2Hrs.)

1. Economics – meaning – definitions – subject matter of economics – traditional approach consumption, production, exchange and distribution.
2. Modern approach – microeconomics and macroeconomics – methods of economic investigation – deduction and induction.
3. Agricultural economics – definitions – meaning – importance of agricultural economics – branches of agricultural economics
4. Agricultural production economics – meaning – definitions – subject matter – objectives; Farm management – meaning – scope – definitions – objectives
5. Agricultural finance – meaning – definitions – micro vs macro finance – need for agricultural finance; Agricultural marketing – meaning – definition – importance of agricultural marketing.
6. Basic terms and concepts in economics – goods and services – free and economic goods, utility – cardinal and ordinal approaches – characteristics of utility – forms of utility.

UNIT – II: (2 Hrs.)

1. Value – definition – characteristics; price – meaning; wealth – meaning attributes of wealth – types of wealth – distinction between wealth and welfare; Wants – meaning characteristics of human wants
2. Law of diminishing marginal utility – statement – assumptions of law explanation – limitations of the law – importance
3. Law of equi-marginal utility – meaning – assumptions – explanation of the law – limitations of the law – practical importance
4. Consumer' s surplus – meaning – assumptions – explanation – difficulties in measuring consumer's surplus – importance

5. Demand – meaning – definition – types of demand – income demand, price demand and cross demand.

UNIT – III: (2 Hrs.)

1. Elasticity of demand – meaning – elastic and inelastic demand – kinds of elasticity of demand – perfectly elastic, perfectly inelastic, relatively elastic, relatively inelastic and unitary elastic demand.
2. Price elasticity – income elasticity and cross elasticity of demand – practical importance of elasticity of demand.
3. Supply – meaning – definition – Law of supply – supply schedule – supply curve.
4. Increase and decrease in supply – contraction and extension of supply – factors affecting supply.
5. Elasticity of supply – kinds of elasticity of supply – perfectly elastic, perfectly inelastic relatively elastic, relatively inelastic and unitary elastic – factors affecting elasticity of supply.

UNIT – IV: (2 Hrs.)

1. Characteristics of monopolistic competition – monopoly and oligopoly
2. National income – concepts of national income – gross domestic product, gross national product, net national product, net domestic product – national income at factor cost, personal inco me, disposable income
3. Methods of measurement of national income – product method, income method and expenditure method
4. Public finance – meaning – role and importance of public finance – functions of the government – differences between public finance and private finance
5. Public revenue – meaning – major and minor sources of public revenue

UNIT – V: (2Hrs.)

1. Public expenditure – meaning – need for public expenditure – social and economic overheads, balanced regional growth, development of agriculture and industry, exploitation and development of mineral resources and subsidies and grants to provinces, local governments, and exporters
2. Principles of public expenditure – Principle of maximum social benefits Principle of economy, *i. e.*, wasteful expenditure should be avoided, Principle of sanction, *i. e.*, authorized expenditure, Principle of balanced budget, Canon of elasticity, *i.e.*, fairly flexible and Avoidance of unhealthy effects on production and distribution
3. Inflation – meaning – definition – related concepts of inflation – *deflation, disinflation,* stagflation *and reflation* – measurement of inflation - consumer price index, wholesale price index, producer price index and GDP deflator
4. Types of inflation – demand pull and cost push inflation – comprehensive and sporadic inflation – suppressed and repressed inflation – creeping, walking, running and galloping inflation – mark up inflation
5. Causes of inflation – factors causing increase in demand – increase in money supply, increase in disposable income, increase in public expenditure, increase in consumer spending, cheap monetary policy, deficit financing and increase in exports, factors causing sho rtage of supply – shortage of factors of production, industrial disputes, natural calamities, artificial scarcities, increase in exports, lop -sided production, Law of diminishing returns and international factors

References Text Books:

1. Dewett, K.K. and Chand, A. 1979. *Modern Economic Theory.*
2. S. Chand and Co., New Delhi. Dewett, K.K. and Varma, J.D. 1986. *Elementary Economics.*
3. S. Chand and Co., New Delhi. Jhingan, M. L. 1990. *Advanced Economic Theory.* Vikas Publishing House, New Delhi.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

I SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time: 30hrs/week

AGRD171 (1) **INTRODUCTION TO PLANT PATHOLOGY** Marks:100

PRACTICAL SYLLABUS

OBJECTIVES:

- To prevent and control disease of economic importance.
- To preventing the introduction and spread of pests.
- To study about different groups: fungi, bacteria, fastidious vascular bacteria.

Course Outcomes:

CO1: Explain the Importance of plant diseases, scope and objectives of Plant Pathology.

CO2: Summarize Diseases and symptoms due to abiotic causes. Fungi: General characters, definition of fungus, somatic structures.

CO3: Explain Basic methods of classification and reproduction and Nematodes: General morphology and reproduction.

EXPERIMENTS:

1. Study of vegetative structures of fungi and their modifications. **(4 Hrs.)**

2. Study of reproductive (sexual and asexual) structures of fungi. **(4 Hrs.)**

3. Study of Pythium and Phytophthora. **(4 Hrs.)**

4. Study of Albugo. **(4 Hrs.)**

5. Study of imperfect fungi – Aspergillus, Penicillium and Pyricularia. **(2 Hrs.)**

6. Study of imperfect fungi – Fusarium, Rhizoctonia and Sclerotium. **(4 Hrs.)**

7. Isolation of phytopathogenic bacteria (locally available diseased plant material) and Study of colony characteristics and Gram's staining. **(4 Hrs.)**

8. Demonstration of mechanical transmission of plant viruses. **(4 Hrs.)**

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

I SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time: 3hrs/week

AGRD171 (2) **INTRODUCTION TO PLANT PATHOLOGY** Marks:100

SYLLABUS

OBJECTIVES:

1. To prevent and control disease of economic importance
2. To prevent the introduction and spread of pests.
3. To study different groups: fungi, bacteria, fastidious vesicular bacteria
4. To Study about Nematodes and General morphology and reproduction

Course Outcomes: At the end of the course, students will be able to

CO1: Explain the scope and concepts of plant pathology.
CO2: Compare morphological and anatomical characters of fungi
CO3: Outline the rules of nomenclature and classification of fungi.
CO4: Identify viruses and classify plant parasites.
CO5: Explain different plant nematodes and characters.

UNIT – I: **(6 Hrs.)**

1. Importance of plant diseases, scope and objectives of Plant Pathology.

2. Important plant pathogenic organisms,

3.Different groups: fungi, bacteria, fastidious vesicular bacteria, phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa, phanerogamic parasites and nematodes with examples of diseases caused by them.

UNIT – II: **(6 Hrs.)**

1. Diseases and symptoms due to abiotic causes. Fungi: General characters, definition of fungus, somatic structures,

2. Types of fungal thalli, fungal tissues, Modifications of Thallus, reproduction (asexual and sexual).

UNIT – III: **(6 Hrs.)**

1. Nomenclature, Binomial system of nomenclature, rules of nomenclature.

2. Classification of fungi. Key to divisions, sub-divisions, orders and classes. Bacteria and mollicutes: general morphological characters.

UNIT – IV: **(6 Hrs.)**

1. Basic methods of classification and reproduction. Viruses: nature, architecture, multiplication and transmission. Study of phanerogamic plant parasites.

UNIT-V: **(6 Hrs.)**

1. Nematodes: General morphology and reproduction

2. Classification, symptoms and nature of damage caused by plant nematodes (Heterodera, Meloidogyne, Anguina etc.)

References Text Books:

1. Alexopoulos, C.J., Mims C.W. and Blackwell M. 1996. Introductory Mycology.
2. Wiley Eastern Ltd., New York. Mandahar, C.L. 1987.
3. Introduction to Plant Viruses. S. Chand and Co., New Delhi.
4. Mehrotra, R.S. and Aneja, K.R. 1990. An Introduction to Mycology.

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

II SEMESTER AGRICULTURE AND RURAL DEVELOPMENT Time: 30hrs/week

AGRD103 (2) **AGRO METEOROLOGY AND CLIMATIC CHANGE** Marks:100

OBJECTIVES:

- To study about climatic resources of a given area for effective crop planning
- To evolve weather based effective farm operations
- To study crop weather relationship
- To understand roles of agro meteorology in agriculture

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Explain the earth's atmosphere and weather variables.

CO2: Outline types of precipitation

CO3: Summarize artificial rain making, monsoon mechanism and weather hazards.

CO4: Relate weather conditions to agriculture.

CO5: Discuss weather forecasting and impact of climate change on agriculture.

UNIT – I: (6Hrs.)

1. Earth atmosphere, composition, extent and structure; Atmospheric weather variables; Atmospheric pressure, its variation with height

2. Wind, types of wind, daily and seasonal variation of wind speed, cyclone, anticyclone, land breeze and sea breeze.

UNIT – II: (6Hrs.)

1. Atmospheric humidity, concept of saturation, vapour pressure, process of condensation, formation of dew, fog, mist, frost, cloud.

2. Precipitation, process of precipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formation and classification.

UNIT – III: (6Hrs.)

1. Artificial rainmaking; Monsoon, mechanism and importance in Indian agriculture. Weather hazards, drought, floods, frost, tropical cyclones and extreme weather conditions such as heat-wave and cold wave;

2. Agriculture and weather relations, modifications of crop microclimate, climatic normal for crop and livestock production.

UNIT – IV: (6Hrs.)

1. Atmospheric temperature, temperature inversion, lapse rate, daily and seasonal variations of temperature, vertical profile of temperature, energy balance of earth;

2. Nature and properties of solar radiation, solar constant, depletion of solar radiation, short wave, long wave and thermal radiation, net radiation, albedo. **(6Hrs.)**

UNIT-V:

1. Weather forecasting, types of weather forecast and their uses.

2. Climate change, climatic variability, global warming, causes of climate change and its impact on regional and national Agriculture.

REFERENCES TEXT BOOKS:

1. Radha Krishna Murthy,V.2016. Principles and practices of agricultural disaster management. B.S Publications, Koti, Hyderabad.
2. Reddy, S.R.2014. Introduction to Agriculture and Agrometeorology. Kalyani Publishers, Ludhiana, Punjab.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
II SEMESTER AGRICULTURE AND RURAL DEVELOPMENT Time: 30hrs/week
AGRD 103P(1) **AGRO METEOROLOGY AND CLIMATIC CHANGES** Marks:50

PRACTICAL SYLLABUS

OBJECTIVES:

- To study about climatic resources of a given area for effective crop planning.
- To study about crop weather relationship.
- To understand the roles of Agro meteorology agriculture.

Course Outcomes:

CO1: Classify Earth atmosphere, composition, extent and structure; Atmospheric weather variables; Atmospheric pressure, its variation with height.

CO2: Explain Nature and properties of solar radiation, solar constant, depletion of solar radiation, short wave, long wave and thermal radiation, net radiation, albedo.

CO3: Discuss about Atmospheric humidity, concept of saturation, Artificial rainmaking and types of weather forecast and their uses.

EXPERIMENTS:

1. Visit to Agrometeorological Observatory, site selection and layout plan for observatory. **(4hrs.)**
2. Exposure to agrometeorological instruments and weather data recording.**(4 Hrs.)**
3. Measurement of albedo and sunshine duration. **(4 Hrs.)**
4. Computation of radiation Intensity using bright sun shine hours. **(4 Hrs.)**
5. Tabulation of maximum and minimum temperatures, trend and variation analysis for climate change of the region. **(2 Hrs.)**
6. Measurement of soil temperature and computation of soil heat of lux **(2 Hrs.)**
7. Determination of atmospheric pressure and vapour pressure. **(2 Hrs.)**
8. Determination of relative humidity. **(4 Hrs.)**
9. Determination of dew point temperature - Measurement of atmospheric pressure and analysis of atmospheric conditions. **(4 Hrs.)**

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

II SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time: 30hrs/week
AGRD120 (2) **EXTENSION AND RURAL DEVELOPMENT IN INDIA** Marks:100

SYLLABUS

OBJECTIVES:

- To study Audio- visual aids – Meaning, importance
- To study about Planning and preparation of extension literature –
- Leaflet, folder, pamphlet, booklet, news stories and success stories.
- To study learn about Farmers' Training Centre (FTC).
- To study about Extension teaching methods

COURSE OUTCOMES:

CO1: Students will understand about Education, Meaning, definition and Types
CO2: Students will understand about Objectives and principles of extension education.
CO3: Students will understand about Extension efforts in pre- independence era
CO4: Students will understand about Extension / Agriculture development programme launched by ICAR / Govt. of India
CO5: Students will learn about New trends in agriculture extension.

THEORY

UNIT – I: **(6Hrs)**

1. Education - Meaning, definition and Types – Formal, non-formal and informal education.
2. Extension Education – Meaning, definition, concepts - Characteristics, scope and process.
3. Objectives and principles of extension education.
4. Extension programme planning – Meaning, process, principles.
5. Extension programme planning – Steps in programme development. 5. Extension systems in India.
6. Extension efforts in pre-independence era – Sriniketan, Marthandam, Sevagram, Firka Development Scheme, Gurgaon Experiment, etc

UNIT – II: **(6hrs)**

1. Extension efforts in post- independence era - Etawah pilot project, Nilokheri experiment etc.
2. Extension/ Agriculture development programme launched by ICAR/ Govt. of India – IADP, IAAP and HYVP.
3. Extension / Agriculture development programme launched by ICAR / Govt. of India – SFDA, MFAL and T & V System.
4. a) Extension / Agriculture development programme launched by ICAR
5. / Govt. of India, KVK, ORP and ND. b) IVLP.

6. a) Extension / Agriculture developmen t programmes launched by ICAR
7. Govt. of India – NATP, ATMA, SREP, ATIC. b) NAIP.
8. New trends in agriculture extension – Privatization extension and cyber extension / e-extension.

UNIT – III: (6hrs)

1. New trends in agriculture extension – Market led extension, farmer- led extension, expert systems, etc.
2. Community development – Meaning, definition, concept and principle- Philology of C.D.
3. Rural development - Meaning, definitions, concept, characteristics, objectives, importance and problems in rura l development.
4. Rural development launched by Govt. of India – National Extension Service (NES), Panchayat Raj Systems/ Democratic Decentralization and Panchayat Raj – Need.
5. Rural development launched by Govt. of India – Three tiers of Panchayat Raj system – Powers, functions and organization set up - Mandal system in Andhra Pradesh.
6. Social justice and poverty alleviation programmes – ITDA, IWDP and NERP.

UNIT – IV: (6hrs)

1. Social justice and poverty alleviation programmes – IRDP, JRY, SGRY, SGSY and MGNREGP.
2. Women development programmes – ICDS, DWCRA, RMK, MSY, ANTWA and IKP.
3. Participatory Rural Appraisal (PRA)
4. Rural leadership - Meaning, definition and concept, types of leaders in rural context, roles of leaders and different methods in selection of a leader.
5. Training of leaders – Lay and professional leaders, advantages and limitations in using local leaders in Agricultural Extension.
6. Extension administration - Meaning, definition and concept, principles and functions - Monitoring and evaluation – Meaning, definition and concept, objectives - Types and importance and monitoring and evaluation of extension programmes.
7. Transfer of technology - Concept and models and capacity building of extension personnel farmers – Training – Meaning, definition, types of training – Pre-Service training - In-service, orientation, induction training, refresher training and training for professional qualification.

UNIT – V: (6hrs)

1. Training of farmers, farm women and rural youth – Farmers' Training Centre (FTC) - Objectives – Training organized - District Agricultural Advisory and Transfer of Technology Centre (DAATTC) – Objectives.
2. Extension teaching methods - Meaning, classification, individual, group and mass contact methods, media mix strategies and communication - Meaning and definition
3. Functions of communication, models – Aristotle, Shannon, Weaver, Berlo, Schramm, J. P. Leagans, Rogers and Shoemaker, Litterer, Westley– Macleans and barriers to communication.
4. Agriculture journalism – Meaning – Scope – Importance - Characteristics of News – Factors determining the News value – Types of News and sources of News.
5. Diffusion and adoption of innovation - Meaning, definition, concepts and process and stages and Models of adoption process – Five (5) and Seven (7) stage models - Attributes of innovation – Relative advantage, compatibility, complexity, trialability – obsrevability and predictability.
6. Innovation – Decision process – Meaning – Stages (Knowledge, persuasion, decision, implementation andconfirmation) - Decision process – Meaning – Stages (Knowledge, persuasion, decision, implementation and confirmation) - Concepts - Dissonance – Rejection – Active rejection and passive rejection - Discontinuance – Replacement and disenchantment discontinuance – Over adoption – Rate of adoption and innovativeness.

7. Adopter categories and their characteristics - Factors influencing adoption process – Social, personal and situational.

REFERENCES TEXT BOOKS:

- Adivi Reddy, A. 2006. Extension Eduation. Sree Lakshmi Press, Bapatla.
- Dahama, O.P. and Bhatnagar, O.P. 1999. Extension and Communication for Development. Oxford & IBH Private Limited, New Delhi/ Mumbai.
- Ganesh, R., Mohammad Iqbal and Ananda Raja. 2003. Reaching the Unreached – Basics of Extension Education. Associate Publishing Company, New Delhi.
- Jalihal, K.A. and Veerabhadraiah, V. 2007. Fundamentals of Extension Education and Management in Extension. Concept Publishing House, New Delhi.
- Ray, G.L. 2006. Extension Communication and Management. Naya Prokash/Kalyani Publishers, Kalkatta/Ludhiana.
- Rayudu, C.S. 1997. Communication. Himalaya Publishing House, New Delhi.
- Rogers, E. M. 2003. Diffusion of Innovation. Free Press, New Delhi.
- Soma Sundaram, T. 1977. Producing Agricultural Information Materials. Kansas State University, USA and APAU, Hyderabad.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

II SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time: 15hrs/week

AGRD121 (1) **FUNDAMENTALS OF SOIL SCIENCE** Marks:100

SYLLABUS

OBJECTIVES:

- To identify the different types of soils and its properties
- To know about the weathering and its types
- To identify the role of nitrogen fixation, phosphorous and organic matter in enhancing the soil fertility.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Classify rocks, minerals and soils and explain various aspects of soil.

CO2: Discuss about the soil profile, structure, density and its properties.

CO3: Discuss the importance of nitrogen fixation, role of phosphorous and organic matter in enhancing soil fertility.

CO4: Discuss on soil colloids and its general properties in detail.

CO5: Learn classification of soils, soil taxonomy and groups of soils in India.

UNIT – I: **(3Hrs.)**

1. Introduction - Spheres of the earth atmosphere, hydrosphere and lithosphere – Their characteristics – Origin of soil – Soil and soil components – Mineral matter, organic matter, water and air – Definition of soil and various concepts of soil – Branches of soil science.

2. Rocks – Classification of rocks based on mode of origin –Iigneous rocks, sedimentary rocks and metamorphic rocks – Classification of rocks based on silica content –Weatherability of rocks.

3. Minerals – Primary, secondary, essential and accessory minerals – Primary minerals– Quartz, feldspar, micas, pyroxenes, amphiboles and olivines – Weatherability of primary minerals.

4. Non-silicate minerals – P, Ca, Mg, S and micronutrient containing minerals –Secondary silicate minerals – Basic structural units.

5. Weathering – Types of weathering – Physical weathering of rocks – Agents of physical weathering and their role- Biological weathering – Role of flora and fauna in weathering process.

6. Chemical weathering – Solution, hydration, hydrolysis, carbonation, oxidation and reduction.

UNIT – II: **(3Hrs.)**

1. Parent material – Classification of parent materials based on their mode of transport by different agents - Soil formation – Soil forming factors – Classification and their role in soil formation – Catena – Definition.

2. Pedogenic processes – Eluviation, illuviation, humification, calcification, laterization, podzolisation, melanisation, salinization and alkalization.

3. Soil profile –Detailed description of a theoretical soil profile – Differences between surface soil and sub soil.

4. Soil physical properties – Soil texture – Definition – Various inorganic components in soil and their properties – Various textural classes in soil and their properties.

5. Particle size analysis –Stoke's Law – Assumptions and limitations – significance of soil texture.

6. Soil consistence – Consistence of wet and dry soils – Soil crusting – Soil plasticity –Atterberg's plastic limits – Factors affecting plastic limits – Significance of soil consistence.

7. Soil structure – Classification – Types, classes and grades of soil structure – Importance of soil structure and its management.

UNIT – III: (3Hrs.)

1. Soil density – Bulk density and particle density – Factors affecting density parameters – Importance of bulk density of soil – Soil compaction –Iits importance – Calculation of porosity.
2. Soil strength and its importance – Soil colour – Components – Significance of soil colour.
3. Soil water – Forces of soil water retention – pF concept – Soil moisture characteristic curves – Importance of soil water.
4. Soil water potential – Components of water potentials – Soil moisture constants – Field capacity, wilting coefficient, hygroscopic water and saturation – Available water and methods for determining soil moisture constants – Pressure plate and pressure membrane apparatus.
5. Soil water content – Soil water movement – Darcy's Law – Saturated, unsaturated and vapour flows – Infiltration, percolation and permeability – Distribution of waterin profile in different soils – Soil drainage and its importance.
6. Soil temperature – Sources of heat – Heat capacity and conductivity –factors influencing soil temperature – Modification of soil thermal regimes – Measurement of soil temperature – Importance of soil temperature on crop growth –Management of soil temperature and importance.
7. Soil air – Compositions of atmospheric air and soil air – Gaseous exchange –Influence of soil air on plant growth, soil properties and nutrient availability – Measurement of oxygen diffusion rate – Measures to improve soil aeration.
8. Soil reaction, pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability.

UNIT – IV: (3Hrs.)

1. Soil colloids – Definition – General properties – Shape, surface area, electrical charge, adsorption, flocculation, deflocculation, plasticity, cohesion, swelling, shrinkage, Tyndall effect and Brownian movement.
2. Secondary silicate clay minerals of different types – Kaolinite, illite, montmorillonite and chlorite – Properties – Allophones.
3. Origin of charge in organic and inorganic colloids – Negative and positive charges– Differences between organic and inorganic soil colloids.
4. Adsorption of ions – Types of ion exchange – Cation and anion exchange – Catio and anion exchange capacities of soil – Base saturation – Factors affecting ion exchange capacity of soils – Importance of Cation Exchange Capacity (CEC) of soils – Calculation of base exchange capacity and exchangeable acidity.
5. Soil biology – Biomass – Flora and fauna – Their important characteristics – Role of beneficial organisms – Organic matter decomposition, mineralization and immobilization.
6. Nitrogen fixation, denitrification , solubilization of phosphorus and biological control of plant diseases – Promotion of plant growth promoting substances –Harmful activities of soil organisms.

UNIT – V: **(3Hrs.)**

1. Soil organic matter – Various sources – Composition – Compounds in plant residues– Their decomposability – Humus – Definition – Synthesis of humus.
2. Soil organic matter and humus – Importance - Fractionation of soil humus – Carbon cycle – Carbon : nitrogen (C:N) ratio of commonly available organic residues –Significance of C:N ratio in soil fertility.
3. Soil classification – Early system of soil classification – Diagnostic horizons.
4. Soil taxonomy – Order, sub order, great group and family series – Nomenclature according to soil taxonomy.
5. Soil groups of India – Alluvial soils, black soils, red soils, laterite soils and coastal sands.

REFERENCE TEXT BOOKS:

1. Indian Society of Soil Science. 2012. Fundamentals of Soil Science, IARI, New Delhi.
2. Das, D. K .2015. Introductory Soil Science, 4th Edition, Kalyani Publishers, New Delhi
3. Sehgal,J. 2015. A Text Book of Pedology – Concepts and Applications, Kalyani Publishers, New Delhi.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

II SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time: 30hrs/week

AGRD121P (1) **FUNDAMENTALS OF SOIL SCIENCE** Marks:50

PRACTICAL SYLLABUS

OBJECTIVES:

9. To identify the different types of soils and its properties
10. To know about the weathering and its types
11. To identify the role of nitrogen fixation, phosphorous and organic matter in enhancing the soil fertility.

COURSE OUTCOMES:

CO1: Classify rocks, minerals and soils and explain various aspects of soil.

CO2: Discuss about the soil profile, structure, density and its properties.

CO3: Discuss the importance of nitrogen fixation, role of phosphorous and organic matter in enhancing soil fertility.

CO4: Discuss on soil colloids and its general properties in detail.

CO5: Learn classification of soils, soil taxonomy and groups of soils in India.

EXPERIMENTS:

1. Methods of chemical analysis, principles, techniques and calculations **(2Hrs.)**

2. Study of soil sampling tools, collection of representative soil sample, its Processing and storage. **(4Hrs.)**

3. Description of soil profile in the field. **(2Hrs.)**

4. Studies of capillary rise phenomenon of water in soil column and water movement in soil. **(2Hrs.)**

5. Determination of texture by feel method. **(4Hrs.)**

6. Determination of mechanical composition of soil using Bouyoucos Hydrometer.**(2Hrs.)**

7. Determination of bulk density and particle density of soil and porosity. **(4Hrs.)**

8. Determination of soil moisture content by gravimetric method. **(2Hrs.)**

9. Determination of infiltration rate. **(2Hrs.)**

10. Determination of soil strength by cone penetrometer. **(2Hrs.)**

11. Aggregate analysis by wet sieving method. **(2Hrs.)**

12. Determination of soil pH & EC of soil. **(2Hrs.)**

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

II SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time: 15hrs/week

AGRD131 (1) **FUNDAMENTALS OF ENTOMOLOGY** Marks:100

SYLLABUS

OBJECTIVES:

- To study of insects and their relationship to humans and environment
- To study about types of reproduction
- To study about insect taxonomy
- To study about Body segmentation. Structure of Head, thorax and abdomen.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: Classify insecta and account for their abundance and dominance

CO2: Explain the morphology and anatomy of insects.

CO3: Discuss the life cycle and endocrine systems of insects

CO4: Summarize the taxonomical features in various orders of insecta.

UNIT – I: **(3 Hrs.)**

1. History of Entomology in India. Factors for insect's abundance. Major points related to dominance of Insecta in Animal kingdom. Classification of phylum Arthropoda upto classes.

2. Relationship of class Insecta with other classes of Arthropoda. Morphology: Structure and functions of insect cuticle and moulting.

UNIT – II: **(3 Hrs.)**

1. Body segmentation. Structure of Head, thorax and abdomen.

2. Structure and modifications of insect antennae, mouth parts, legs, wing venation, modifications and wing coupling apparatus.

3. Structure of male and female genital organs. Metamorphosis and diapause in insects.

UNIT – III: **(3 Hrs.)**

1. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretory (Endocrine) and reproductive systems in insects.

2. Types of reproduction in insects. Major sensory organs like simple and compound eyes and chemoreceptors.

UNIT – IV: **(3 Hrs.)**

1. Systematics: Taxonomy–importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order.

2. Classification of class Insecta upto orders. basic groups of present day insects with special emphasis to orders and families of agricultural importance like Arthoptera: Acrididae, Tettigonidae, Gryllidae, Gryllotalpidae;

UNIT – V: (3 Hrs.)

- Dictyoptera: Mantidae, Blattidae; Odonata; Isoptera: Termitidae; Thysanoptera: thripidae; Hemiptera: Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae, Lygaeidae, Miridae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae, Aleurodidae, Pseudococcidae; Neuroptera: Chrysopidae; Lepidoptera:

2. Pieridae, Papiloinidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Lymantridae, Saturniidae, Bombycidae;

3. Coleoptera: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Apionidae, Bruchidae, Scarabaeidae;

REFERENCES TEXT BOOKS:

1. Chapman, R. F 2013 Insects: Structure and Function. Ed by Simpson, S. J. and Douglas, A. C. Cambridge Univ. Press, UK.

2. Richards, O.W. and Davies, R.G 1977. Imm's General Text Book of Entomology (Vol. I and II). Chapman and Hall, London.

3. Wigglesworth, V.B 2013. Insect Physiology. Springer (Originally published by Chapman and Hall, London, 1974).

4. Pant, N.C. and Ghai, S. 198. Insect Physiology and Anatomy. ICAR, New Delhi.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

II SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time:30hrs/week

AGRD131P(1) **FUNDAMENTALS OF ENTOMOLOGY** Marks:50

PRACTICAL SYLLABUS

OBJECTIVES:

- To study about insects and their relationship to humans and environment
- To study about types of reproduction
- To study about insect taxonomy

COURSE OUTCOMES:

CO1: Explain History of Entomology in India

CO2: Summarize the Structure and modifications of insect antennae, mouth parts, legs, wing venation, modifications and wing coupling apparatus.

CO3: Classify the Types of reproduction in insects and classify Insect Taxonomy

EXPERIMENTS:

1. Methods of collection and preservation of insects including immature stages; External features of Grasshopper/Blister beetle. **(8 Hrs.)**

2. Types of insect antennae, mouthparts and legs; Wing venation, types of wings and wing coupling apparatus. **(8 Hrs.)**

3. Types of insect larvae and pupae; Dissection of digestive system in insects (Grasshopper); Dissection of male and female reproductive systems in insects (Grasshopper).

(7 Hrs.)

4. Study of characters of orders Orthoptera, Dictyoptera, Odonata, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance.

(7 Hrs.)

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

II SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time: 15hrs/week

AGRD151 (1) **SOIL AND WATER CONSERVATION ENGINEERING** Marks:100

SYLLABUS

OBJECTIVES:

- To study about natural resources management for sustainable agriculture.
- To study about management of land and water.
- To study about irrigation projects.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Discuss types of soil erosion, and control measures.
CO2: Explain the concept of irrigation water measurements.
CO3: Outline different water harvesting techniques.

UNIT – I: **(3Hrs.)**

1. Introduction to soil and water conservation and causes of soil erosion.
2. Definition and agents of soil erosion, water erosion - Forms of water erosion - Gully classification and control measures.
3. Soil loss estimation by universal soil loss equation - Soil loss measurement techniques.

UNIT – II: **(3Hrs.)**

1. Principles of erosion control - Introduction to contouring, strip cropping.
2. Contour bund - Graded bund and bench terracing.
3. Wind erosion - Mechanics of wind erosion, types of soil movement - Principles of wind erosion control and its control measures.
4. Grassed water ways and their design.

UNIT – III : **(3Hrs.)**

1. Introduction to irrigation - Classification of irrigation projects.
2. Importance of irrigation water measurements - Volumetric, area velocity, discharge methods - Weirs, orifice, flumes.
3. Open channel hydraulics - Discharge calculations.

UNIT – IV: **(3Hrs.)**

1. Types of wells - Water lifting devices - Classification of pumps, their capacity, power requirement and discharge calculations.
2. Functional components and working principle of underground pipeline systems.

UNIT – V: **(3Hrs.)**

1. Functional components of micro irrigation systems and its design like drip, sprinkler irrigation systems etc.
2. Water harvesting techniques - Lining of ponds, tanks and canal systems.

References Text Books

1. Ghanshyam Das., 2012. Hydrology and Soil Conservation Engineering, including Watershed Management. Second edition, PHI Learning Private Limited, New Delhi - 110001
2. Murthy, V. V.N., 2004. Land and Water Management Engineering. Kalayani Publishers, New Delhi
3. Michael A.M., 2007. Irrigation Theory and Practice. Second edition. Vikas Publishing House Pvt. Ltd.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

II SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time: 30hrs/week

AGRD151P(1) **SOIL AND WATER CONSERVATION ENGINEERING** Marks:50

PRACTICAL SYLLABUS

OBJECTIVES:

1. To study about natural resources management for sustainable agriculture
2. To study about management of land and water
3. To study about irrigation projects

Course Outcome:

CO1: Outline the soil and water conservation and causes of soil erosion.

CO2: Explain Wind erosion –Mechanics of wind erosion, types of soil movement.

CO3: Summarize Open channel hydraulics, soil loss estimation and components of micro irrigation

EXPERIMENTS:

1. Practicing survey- Principles and educating to use pacing technique for measurement. (2 hrs.)
2. Area calculations through chain survey - GPS demo for tracking and area measurement. (4 hrs.)
3. Estimation of soil loss and calculation of erosion index. (4 hrs.)
4. Levelling concepts and practical utility in agriculture. (2 hrs.)
5. Water discharge measurements lab exercises for computing discharge. (2 hrs.)
6. Different irrigation pumps and their constructional differences. (2 hrs.)
7. Farm Pond construction and its design aspects. (4 hrs.)
8. Farm Pond and canal lining and its procedures. (4 hrs.)
9. Visit to nearby farm pond. (4 hrs.)

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

II SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time:4hrs/week

HORD181(1) **FUNDAMENTALS OF HORTICULTURE** Marks:50

SYLLABUS

OBJECTIVES:

- To identify garden tools.
- To identify horticultural crops.
- To prepare different types nursery beds.

Course Outcomes

At the end of the course, students will be able to

CO1: Define, classify and outline the climate and soil conditions for horticultural crops.

CO2: Explain principles and methods of plant propagation, training and pruning.

CO3: Summarize principles and steps in establishment of various orchards and types and purposes of gardens.

CO4: Discuss unfruitfulness, pollination and fertilization.

CO5: List medicinal and aromatic plants, spices and condiments and explain the role of plant bio regulators, irrigation and fertilizers in horticulture crops.

UNIT – I:

1. Definition of Horticulture - Division of Horticulture - Pomology, Olericulture, Floriculture, spices & Condiments, Medicinal and Aromatic plants, Ornamental and Landscape architecture and Post-Harvest Technology etc. Importance of horticulture in national economy and in human nutrition. Scope of Horticulture
2. Horticultural & Botanical classification – Fruits, Vegetables, Ornamental plants, Spices and Plantation crops
3. Climate and soil for horticultural crops – Temperature, Rainfall, Relative humidity, Wind, Soil organic matter, Soil pH, Soil air, soil Water etc.

UNIT – II:

1. Plant propagation methods - sexual asexual and micro propagation. Plant Propagation structures – Polyhouses, Net houses, Plastic tunnels and Mist chambers
2. Principles of orchard establishment – selection of site – Steps in establishment of orchard – clearing of the land – leveling – fencing – purpose of raising fence – live and non-live fences – good fence plant characters – examples of live and non-live fences – wind breaks – roads – drains – tillage – sowing green manure crops – marking plant positions – digging and filling of pits – selection of plants from the nursery – lifting and packing of plants – season of planting – planting and healing inn

3. Principles and Methods of training and pruning – training – definition – objectives of training fruit trees – reasons for training – methods of training – central leader, open center and modified leader systems with merits and demerits
4. Pruning – definition – reasons for pruning – objectives of pruning – responses of plants to pruning – activation of buds, dwarfing response, production of water shoots and delay in bearing – methods of pruning – thinning out, trimming, heading back, pollarding, pinching, disbudding and deblossoming – seasons of pruning – pruning and manuring – care of pruned woods – Juvenility and flower bud differentiation

UNIT – III:

1. Unfruitfulness in fruit trees – causes – environmental causes, nutritional causes, inherent causes, biological causes and cultural causes and their remedies
2. Pollination, pollinizers, and pollinators
3. Fertilization and parthenocarpy

UNIT – IV:

1. Kitchen gardening
2. Garden types and parts
3. Lawn making

UNIT – V:

1. Medicinal & Aromatic plants
2. Spices and Condiments
3. Plant bio regulators - growth regulators and plant hormones – types of growth regulating substances – use of growth regulators in propagation – rooting of cuttings, induction of rooting in layering, union of rootstock and scion in grafting and budding, control of flowering, fruit set, fruit drop, parthenocarpy, fruit ripening, fruit size, quality and sex expression – preparation of growth regulators – powder, solution and lanolinpaste
4. Irrigation & fertilizers application – method and quantity

REFERENCES TEXT BOOKS:

- Adams, C.R. and M. P. Early. 2004. Principles of horticulture. Butterworth – Heinemam, Oxford University Press.
- Prasad and Kumar. 2014, Principles of Horticulture 2nd Edn. Agro bios (India)
- Kumar, N.1997. Introduction to Horticulture, Rajalakshmi Publication,Nagercoil.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

II SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time: 2hrs/week

AGRD181P (1) **FUNDAMENTALS OF HORTICULTURE** Marks:50

PRACTICAL SYLLABUS

OBJECTIVES:

To identify garden tools.

To identify horticultural crops.

To prepare different types nursery beds.

Course Outcomes:

CO1: Define, classify and outline the climate and soil conditions for horticultural crops.

CO2: Explain principles and methods of plant propagation, training and pruning.

: Summarize principles and steps in establishment of various orchards and types and purposes

CO3of gardens and irrigation and fertilizers in horticulture crops.

CO4: Discuss unfruitfulness, pollination and fertilization and List medicinal and aromatic plants, spices and condiments and explain the role of plant bio regulators,

PRACTICALS:

1. Study of features of orchard, planning and layout of orchard.
2. Study of Tools and implements in Horticulture.
3. Identification of various horticultural crops
4. Preparation of nursery beds for sowing of vegetable seeds
5. Lay out of different planting systems
6. Study of different methods of Training
7. Study of different methods of Pruning
8. Preparation of fertilizer mixtures and field application
9. Preparation and application of growth regulators
10. Layout of different irrigation systems

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
II SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time: 4 hrs/week
HORD182 (1) **PRODUCTION TECHNOLOGY FOR MEDICINAL & AROMATIC PLANTS** Marks:100
SYLLABUS

OBJECTIVES:

To Identify Medicinal and Aromatic Crops
To prepare and planting of Medicinal and Aromatic Crops
Learn to prepare Essential oils .
Benefits of Medicinal and Aromatic Crops.

Course Outcomes

CO1: Students will be able to understand the importance and research institutes in our country
CO2: Students will understand about Production technology of medicinal, aromatic & Crops.
CO3: Students will understand about processing in aromatic plants.
CO4: Uses and preparation of essential oils.

THEORY

UNIT – 1:

1.Introduction History, importance, present status (export & import), future prospects and constraints in the cultivation of medicinal plants.
2. Research institutes working on medicinal and aromatic plants- National, AICRP, Directorates.
3. Aloe, Ashwagandha, Belladonna Importance and uses ,chemical composition, origin and distribution, description of plant, species and varieties, area and production, soil and climate, land preparation, propagation and nursery techniques, planting and after care, irrigation, nutrition, cultural operations, plant protection, harvesting and yield, processing.
4.Dioscorea,Isabgol, Kalmegh, Importance and uses ,chemical composition, origin and distribution, description of plant, species and varieties, area and production, soil and climate, land preparation, propagation and nursery techniques, planting and after care, irrigation, nutrition, cultural operations, intercropping, staking plant protection, harvesting and yield, processing and grading.

UNIT – II:

1. *Opium poppy, Periwinkle, Rauvolfia,Senna* Importance and uses ,chemical composition, origin and distribution, description of plant, species and varieties, area and production, soil and climate, land preparation, propagation, planting and after care, irrigation, nutrition, cultural operations, lancing and latex collection, harvesting and yield of seed and crude opium, processing.
2. *Pyrethrum* Importance and uses ,chemical composition, origin and distribution, description of plant, species and varieties, area and production, soil and climate, land preparation, propagation and nursery techniques, planting and after care, irrigation, nutrition, cultural operations, plant protection, harvesting and yield, processing, pyrethrin content, extraction and storage.
3. Datura, *Centella asiatica, Tinospora cardifolia,* Brahmi, Guggal, Glori lilly, *Phyllanthus amarus.* Common name, scientific name, family, economic part, uses.
4. Introduction History, importance, present status (export & import),future prospects, opportunities and constraints in the cultivation of aromatic plants. Extraction methods Extraction methods for essential

oil crops- distillation methodology, advantages and disadvantages of water distillation, water and steam distillation, steam distillation.

5. Ambrette {musk},Citronella, Importance and uses , origin and distribution, description of plant, species and varieties, area and production, soil and climate, land preparation, propagation and nursery techniques, planting and after care, irrigation, nutrition, cultural operations, plant protection, harvesting and yield.

UNIT – III :

1. Lemongrass,Geranium, Khus grass, Palmarosa Importance and uses, origin and distribution, varieties, description of plant, area and production, soil and climate, land preparation, propagation, planting and after care, irrigation, nutrition, cultural operations, harvesting and yield of herb and oil.

2. Lavender Importance and uses, origin and distribution,varieties, description of plant, area and production, soil and climate, land preparation, propagation, planting and after care, irrigation, nutrition, cultural operations, harvesting and yield.

REFERENCES TEXT BOOKS:

- Atul, C.K. and Kapur, B.K. (1982). Cultivation and utilization of medicinal plants. RRL., CSIR, Jammu-Tawi.
- Chopra, R.N., Nayar, S.L. and Chopra, I.C. (1956). Glossary of Indian medicinal plants. CSIR, New Delhi.
- Cunningham, A. 2014. Applied Ethnobotany: "People, Wild Plant Use and Conservation". Taylor & Francis,
- EIRI Board. (2007). Handbook of Medicinal and Aromatic Plants: Cultivation, Utilisation and Extraction Ethnobotany. Principles and applications. (1997).
- C. M. Cotton. John Wiley and Sons Ltd. 424p. Gunther, E. (1975). The essential oils. Robert, K Krieger Pub. Co., New York. Jain, S.K. 2010. Manual of Ethnobotany (2nd Ed). Scientific Publishers, India, 242p.
- Maheshwari, J.K. 2000. Ethnobotany and medicinal plants of Indian subcontinent. Scientific Publishers, Jodhpur, India, 672p

- Atul, C.K. and Kapur, B.K. (1982). Cultivation and utilization of medicinal plants. RRL., CSIR, Jammu-Tawi.
- Chopra, R.N., Nayar, S.L. and Chopra, I.C. (1956). Glossary of Indian medicinal plants. CSIR, New Delhi.
- Cunningham, A. 2014. Applied Ethnobotany: "People, Wild Plant Use and Conservation". Taylor & Francis,
- EIRI Board. (2007). Handbook of Medicinal and Aromatic Plants: Cultivation, Utilisation and Extraction Ethnobotany. Principles and applications. (1997).
- C. M. Cotton. John Wiley and Sons Ltd. 424p. Gunther, E. (1975). The essential oils. Robert, K Krieger Pub. Co., New York. Jain, S.K. 2010. Manual of Ethnobotany (2nd Ed). Scientific Publishers, India, 242p.
- Maheshwari, J.K. 2000. Ethnobotany and medicinal plants of Indian subcontinent. Scientific Publishers, Jodhpur, India, 672p

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
II SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time:2hrs/week
HORD182P (1) **PRODUCTION TECHNOLOGY FOR MEDICINAL & AROMATIC PLANTS** Marks:100
PRACTICAL SYLLABUS

OBJECTIVES:

To Identify medicinal and aromatic plants
To prepare and planting of medicinal and aromatic crops.
Plant protection of medicinal and aromatic crops
Processing of medicinal and aromatic crops.

COURSE OUTCOMES:

CO1: Students will be able to understand the importance and research institutes in our country
CO2: Students will understand about Production technology of medicinal and aromatic crops
CO3: Plant Protection of medicinal and aromatic crops

EXPERIMENTS:

1. Seed propagation-Scarification and stratification of seeds.
2. Collection of locally available medicinal plants, aromatic plant description and preparation of herbarium
3. Harvesting Processing techniques for important medicinal plants
4. Propagation and nursery techniques for important aromatic plants.
5. Harvesting techniques for important aromatic plants

REFERENCES TEXT BOOKS:

Atul, C.K. and Kapur, B.K. (1982). Cultivation and utilization of medicinal plants. RRL., CSIR, Jammu-Tawi.
Chopra, R.N., Nayar, S.L. and Chopra, I.C. (1956). Glossary of Indian medicinal plants. CSIR, New Delhi.
Cunningham, A. 2014. Applied Ethnobotany: "People, Wild Plant Use and Conservation". Taylor & Francis,
EIRI Board. (2007). Handbook of Medicinal and Aromatic Plants: Cultivation, Utilisation and Extraction
Ethnobotany. Principles and applications. (1997).
C. M. Cotton. John Wiley and Sons Ltd. 424p. Gunther, E. (1975). The essential oils. Robert, K Krieger Pub. Co., New York. Jain, S.K. 2010. Manual of Ethnobotany (2nd Ed). Scientific Publishers, India, 242p.
Maheshwari, J.K. 2000. Ethnobotany and medicinal plants of Indian subcontinent. Scientific Publishers, Jodhpur, India, 672p
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Chopra, R.N., Nayar, S.L. and Chopra, I.C. (1956). Glossary of Indian medicinal plants. CSIR, New Delhi.
Cunningham, A. 2014. Applied Ethnobotany: "People, Wild Plant Use and Conservation". Taylor & Francis,
EIRI Board. (2007). Handbook of Medicinal and Aromatic Plants: Cultivation, Utilisation and Extraction
Ethnobotany. Principles and applications. (1997).
Maheshwari, J.K. 2000. Ethnobotany and medicinal plants of Indian subcontinent. Scientific Publishers, Jodhpur, India, 672p

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

II SEMESTER **SKILL ENHANCEMENT COURSE** Time:15hrs/week

LSRD103 (2) **LIVESTOCK & POULTRY MANAGEMENT** Marks:50

SYLLABUS

OBJECTIVES:

- To study about body points/parts of different domesticated animals and poultry
- To Approach and handling methods of restraining.
- To Identify methods of farm animals and poultry (branding, tattooing, notching & tagging).

COURSE OUTCOMES

CO1: Elaborate on the demographic distribution and population dynamics of livestock

CO2: Explain the design and construction of livestock and poultry buildings.

CO3: Categorize the breeds of livestock and explain their management.

CO4: Discuss the nutritional and Disease management of livestock and poultry.

UNIT – I: **(4 Hours)**

1. Demographic distribution of live-stock population.
2. Population dynamics of live-stock and role in Indian economy.
3. Reproduction in live-stock and poultry.
4. Housing systems live-stock and poultry.
5. Design and construction of live-stock and poultry buildings.
6. Selection of site and General principles affecting the design.

UNIT – II: **(4 Hours)**

1. Arrangements of building.
2. Building materials
3. Indian breeds of cattle, buffalo, sheep, goat, swine and poultry
4. exotic breeds of cattle, buffalo, sheep, goat, swine and poultry
5. Management of calves, growing heifers and milch animals
6. Management of sheep, goat and swine
7. Incubation, hatching and brooding

UNIT – III: **(4 Hours)**

1. Improvement of live-stock and poultry.
2. Digestion and metabolism live-stock and poultry.
3. Classification of feedstuffs for live-stock and poultry.
4. Proximate principles of feed.
5. Nutrients and their functions.

6. Feed ingredients for ration- Balanced ration.

7. General principles of computation of ration.

UNIT – IV **(4 Hours)**

1. Formulation of rations and feeding dairy cattle and buffaloes.
2. Formulation of rations sheep, goat and swine and poultry.
3. Feed supplements Feed additives in the rations of live-stock and poultry.
4. Feeding of live-stock and poultry.
5. Diseases of cattle and buffaloes.
6. Diseases of sheep, goat and swine.

UNIT – V **(4 Hours)**

1. Diseases of Poultry.
2. Sanitation – Sanitation of live-stock and poultry houses.
3. Prevention of infectious diseases in live-stock and poultry.
4. Vaccination schedule for cattle and buffaloes sheep, goat.
5. Vaccination schedule for swine and poultry.
6. Control of infectious diseases in live-stock and poultry.

REFERENCES BOOKS:

1. 19th Livestock Census. (2012). All India Report, Government of India, Ministry of Agriculture, Department of Animal Husbandry, Dairying and Fisheries, Krishi Bhawan, New Delhi: p. 120.

2. Ballard, B and Rockett, J. (2009). Restraint and handling for veterinary technicians and assistants. Delmar Cengage Learning Inc., Cifton Park, USA: p. 172.

3. Banerjee, G.C. (1992). A Textbook of Animal Husbandry. 7th Edn. Oxford and IBH publishing Co. Pvt. Ltd., India.

4. Basic Animal Husbandry & Fisheries Statistics. (2014). Government of India,Ministry of Agriculture, Department of Animal Husbandry, Dairying and Fisheries, Krishi Bhawan, New Delhi: p. 156.

5. Bundy, C.E and Diggins, R.V. 1999. Livestock and poultry production. 3rd ed. Blackwell publishing, UK: p. 298.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

II SEMESTER **SKILL ENHANCEMENT COURSE** Time:15hrs/week

STRD104 (2) **STATISTICAL METHODS** Marks:50

SYLLABUS

OBJECTIVES

- To Prepare frequency distribution for ungrouped data
- To Prepare various graphs and charts
- To Compute of A.M, Median and Mode for grouped and un-grouped data .

COURSE OUTCOMES

CO1: Explain the importance and limitations of statistics in agriculture.
CO2: Interpret agricultural data using central tendency and dispersion measures.
CO3: Explain the importance of probability and testing of hypothesis measures in agricultural field data.
CO4: Apply the correlation and regression methods to interpret agricultural data and apply ANOVA and Sampling methods.

UNIT – I: (3Hrs.)

1. Introduction and various definitions of Statistics - Singular and plural reference of Statistics - A comprehensive definition of Statistics - Importance of Statistics in agriculture - limitations of statistics.
2. Frequency Distribution- Exclusive and inclusive methods - Discrete and continuous variables - Graphical representation of data
3. Central tendency -Definition - Measures of Central tendency - List of all the different measures and study of Arithmetic Mean – Median - Mode in detail (including merits and demerits) for ungrouped and grouped data.
4. Measures of Dispersion – Meaning of measures of Dispersion - Standard Deviation for ungrouped and grouped data- Coefficient of Variation (C.V) - Standard Error (S.E.) and difference between S.D. and S.E.

UNIT – II: (3 Hrs.)

1. Definition of Probability – Addition - Multiplication theorems - Binomial and Poisson distributions

2. Normal Curve and its properties - Identification of normality through data i.e.., criterion. etc., expression for frequency function of Normal distribution

3. Testing of Hypothesis – Concept - Null hypothesis - Type I and Type II Errors Level of Significance - Critical region - General setup of testing - Large Sample Test with known and unknown

UNIT – III (3 Hours)

1. Small Sample test (t-test for one and two samples and Paired t- test) and F-test

2. Chi-Square test for 2x 2 and m x n contingency Table - Yate's correction for Continuity

3. Correlation – Scatter diagram - Positive and negative correlation and its testing

UNIT – IV: **(3 Hours)**

1. Regression – Fitting of linear regression equation of Y on X and X on Y and the inter relation- ship with "r" and testing of regression coefficients

2. Analysis of Variance (ANOVA) - Definition and assumptions - ANOVA with One-way classification (CRD) layout and analysis with equal and unequal repetitions, Advantages and disadvantages

3. ANOVA with Two-way Classification (RBD) - Layout and analysis, Advantages and disadvantages

UNIT – V: **(3 Hours)**

1. ANOVA with three-way classification (LSD) – Layout and Analysis - Advantages and disadvantages.

2. Introduction to Sampling - Sampling Vs Census - Purposive and Random Sampling

3. Simple Random Sampling - Method of selection - Estimates of population mean and total and the estimates of their variances and confidence limits.

REFERENCES TEXT BOOKS:

1. Nageswara Rao, G 2007. Statistics for Agricultural Sciences. B S Publications, Hyderabad

2. Rangaswamy, R 1995. A Text Book of Agricultural Statistics. New Age International (P) Limited, Hyderabad.

3. Chandel SRS, Hand Book of Agricultural Statistics. Achal Prakashan Mandir publications, New Delhi.

4. Agrawal, B.L. Programmed Statistics. 2nd Edition, New Age International Publishers

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
III SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** TIME: 30HRS

AGRD 219 (2) **ECONOMICS FOR RURAL DEVELOPMENT** MARKS:100

SYLLABUS

OBJECTIVES:

- To enable the students to understand the Rural Environment.
- To enrich the students about components of the Rural Economy.
- To enable the students to understand occupational structure.

COURSE OUTCOMES:

CO1: Explain the nature, scope and development of rural economics.

CO2: Outline the features of rural resources management in India.

CO3: Explain the different aspects of rural demography.

CO4: Outline the nature and structure of rural occupations and the concept of work participation rates and unemployment.

UNIT – I: **(6Hrs)**

1. Introduction to Rural Economics, Nature and Scope of Rural Economics, Interdisciplinary approach of Rural Economics –Components-Structure and Characteristics –Pre and Post-independence.

UNIT – II: **(6Hrs)**

1. Rural Resources Management in India, Rural Resources –Nature-Types and Magnitude – Rural Resources, Management and Development, Application of Technology in Rural Development – Problems and prospects.

UNIT – III: **(6Hrs)**

1. Rural Demography – Population Size – Sex and Age Composition- Density of Population, Population Problems and Challenges – Family Welfare Measures in Rural India.

UNIT – IV: **(6Hrs)**

1. Rural Occupational Structure – Nature of Rural Occupations – Occupational Distribution in Rural India – The Concept of Work Participation Rates.

UNIT – V: **(6Hrs)**

1. Rural Poverty and Unemployment – Rural Poverty-Meaning, Estimates, Causes and Consequences.

Unemployment – Meaning, Types, Magnitude of Rural Unemployment, - Causes and Consequences.

References Text Books

- Vasant Desai: Rural Development in India, Himalaya Publishing House, Mumbai, 2012. Dutt and Sundaram- Indian Economy, S.Chand Publications, New Delhi, 2013-07-02.
- Mishra,S.K. and PuriV.K. – Economics of Development and Planning, Himalaya Publishing House, Mumbai, 2012.
- Mukundan,N.-Rural Development and Poverty eradication in India.
- Katar Singh –Rural Development –Principles, Policies and Management.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

III SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** TIME: 30HRS

AGRD 231 (2) **INSECT ECOLOGY & IPM** MARKS:100

SYLLABUS

Objectives:

- To study the influence of ecological factors on insect development.
- To study the components of integrated pest management.
- To study about classification of insects.

Course Outcomes:

CO1: Explain biotic and abiotic factors affecting insect ecology

CO2: Outline the methods of integrated pest management, surveillance and forecasting and principles of host-plant resistance.

CO3: Summarize pest management tools and different methods of pest control and formulations of insecticides and application techniques.

UNIT-I : (4hrs)

1. Insect Ecology- Introduction, Autecology and Synecology-Population-Community Ecosystem – Agro - ecosystem -Environment and its components. Abiotic factors - Temperature-Its effect on the development, fecundity distribution, dispersal and movement of insects - Adaptations of insects to temperature - Thermal constant-Day degrees. Moisture Adaptation of insects to conserve moisture. - Humidity- Its effect on development, fecundity and colour of body - Rainfall - Its effect on emergence, movement and oviposition of insects.

2. Light – Phototaxis - photoperiodism - Its effect on growth, moulting activity or behaviour, oviposition and pigmentation - Use of light as a factor of insect control; Atmospheric pressure and its effect on behavior. Air currents - Effect on dispersal of insects – Edaphic factors.

3. Biotic factors – Food - Classification of insects according to nutritional requirements Other organisms - Inter and Intra specific associations - Beneficial and harmful associations of parasitoids based on site of attack, stage of host, duration of attack, degree of parasitism and food habits. Effect of biotic factors - Competition, natural and environmental resistance

4. Concepts of Balance of life in nature- Biotic potential and environmental resistance. -

Factors contributing to increase or decrease of population - Causes for outbreak of pests in agro ecosystem.

UNIT-II: (3hrs)

1. Practices, Scope and Limitations of IPM - IPM – Definitions, Concepts– Economic Threshold Level (ETL) – Economic Injury Level (EIL) and General Equilibrium Position (GEP) – Modified Equilibrium Position (MEP)- Components/tools of IPM

2. Pest surveillance and pest forecasting – Definition - Importance in IPM – Advantages - Components of pest surveillance, types of forecasting (short term and long-term forecasting and their advantages) – Insect

pests – Definitions of negligible, minor and major pests; Different categories of pests – Regular, occasional, seasonal, persistent, sporadic, epidemic and endemic pests with examples.

3. Host-plant resistance- Principles of host plant resistance – Ecological resistance – Phenological asynchrony, induced resistance and escape – Genetic resistance – Mono, oligo and polygenic resistance – Major gene resistance (vertical/specific/ qualitative) and minor gene resistance (horizontal/nonspecific/quantitative) – Host- plant selection process- host habitat finding, host finding, host recognition, host acceptance and host suitability Mechanisms of Genetic resistance- Non-preference (antixenosis), antibiosis and tolerance – Transgenic plants.

UNIT-III: (3hrs)

1. Components/tools of IPM: Cultural control- Normal and special cultural practices which incidentally control the pests and agronomic practices recommended specifically against the pests with examples.

2. Mechanical control- Different mechanical methods of pest control with examples.

3. Physical control – Use of inert carriers against stored product insects - steam sterilization – Solarization - Solar radiation - Light traps - Flame throwers etc.; Legislative measures - Importance of quarantine - Examples of exotic pests - Different legislative measures enforced in different countries including India.

UNIT-IV: (2hrs)

1. Biological control - Types of biological control – Introduction, augmentation and conservation – Advantages and disadvantages of biological control. Parasite – Parasitoid - Parasitism - Grouping of parasites based on nature of host, stage of host, site of parasitisation, duration of attack, degree of parasitisation and food habits – Kinds of parasitism – qualities/attributes of an effective parasitoid. Predators – Predatism – qualities of insect predator – Differences between predator and parasite. Microbial control - Important groups of microorganisms - Bacteria, viruses and fungi used in pest control and their mass multiplication techniques - Transgenic plant pathogens – Bacteria, fungi and viruses - Entomopathogenic nematodes – Important species - Mode of infectivity and examples.

2. Chemical control - Importance and ideal properties of insecticide - Classification of insecticides based on origin, mode of entry, mode of action and toxicity with list of insecticides - Toxicity evaluation of insecticides - Acute or chronic toxicities, oral and dermal toxicities - LC50 (Median Lethal Concentration), LD50 (Median Lethal Dose), ED50 (Median Effective Dose), LT50 ((Median Lethal time), KD50 (Median Knockdown Dose) and KT50 (Median Knock Down Time) – Bioassay methods.

UNIT-V: (3hrs)

1. Formulations of insecticides - Dusts, granules, wettable powders, water dispersible granules, solutions, emulsifiable concentrates, suspension concentrates, concentrated insecticide liquids, fumigants, aerosols, gels, micro encapsulations, tablets, baits and mixtures of active ingredients – Advantages and disadvantages of chemical control

2. Recent methods of pest control - Repellents (physical and chemical), Antifeedants - importance of antifeedants and limitations of their use – Attractants - Sex pheromones - List of synthetic sex pheromones - Use in IPM - Insect hormones – Gamma irradiation –Genetic control – Sterile male technique.

3. Application techniques of spray fluids- High volume, low and ultra-low volume sprays - Compatibility of pesticides - Phytotoxic effects of insecticides - Safe use of pesticides - Symptoms of poisoning - First aid and antidotes for important groups of insecticides. Insecticide Act 1968- Important provisions - Insecticide resistance, resurgence and residues - Maximum Residue Limits

(MRL) – Acceptable Daily Intake (ADI) – Safe waiting periods.

References text books

1. Vasantharaj David, B. and Rama Murthy V.V. 2016. Elements of Economic Entomology, Popular Book Depot, Coimbatore.

2. Vasantharaj David, B and Aanathakrishnan, T.N. 2006. General and Applied Entomology. Tata McGraw-Hill Publishing House, New Delhi.

3. Metcalf, R.L. and Luckman, W.H. 1982. Introduction to Insect Pest Management. Wiley Inter Science Publishing, New York.

4. Atwal, A. S. and Bains, S.S. 1989. Applied Animal Ecology. Kalyani Publishers, New Delhi

5. Yazdani,S.S. and Agarwal,M.L.1979. Elements of Insect Ecology. Narosa Publishing House,New Delhi.

6. Dhaliwal, G.S. and Ramesh Arora 2001. Integrated Pest Management: Concepts and Approaches, Kalyani Publishers Ludhiana.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

III SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** TIME: 30HRS

AGRD 231P (1) **INSECT ECOLOGY & IPM** MARKS:100

PRACTICAL SYLLABUS

OBJECTIVES:

- To study the influence of ecological factors on insect development.
- To study about the components of integrated pest management.
- To study about classification of insects.

Course Outcomes:

CO1: Explain about Biotic and biotic factors affecting insect ecology

CO2: Outline about pest surveilliance pest forecasting recent methods.

CO3: Explain about Beneficial insect and their mass multiplication.

EXPERIMENTS:

1. Sampling techniques for the estimation of insect population in different crops **(3hrs)**

2. Study of distribution patterns of insects in crop ecosystems **(3hrs)**

3. Techniques for the estimation of insect damage in different crops **(3hrs)**

4. Pest surveillance through light traps, pheromone traps and forecasting of pest incidence **(3hrs)**

5. Acquaintance of insecticide formulations **(3hrs)**

6. Calculation of doses/ concentrations of different insecticidal formulations **(3hrs)**

7. Compatibility of pesticides with other agrochemicals and phytotoxicity of insecticides **(3hrs)**

8. Acquaintance of mass multiplication techniques of important predators –Cryptolaemus. **(3hrs)**

9. Acquaintance of mass multiplication techniques of the egg parasitoid, Trichogramma **(3hrs)**

10. Acquaintance of mass multiplication techniques of Ha NPV and Sl NPV **(3hrs)**

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
III SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** TIME:30HRS

AGRD 241 (2) **AGRICULTURAL FINANCE & CO-OPERATION** MARKS:100

SYLLABUS

Objectives

- To determine most profitable level of capital use.
- To know the Optimum allocation of limited amount of capital among different enterprises.
- To Analyse of progress and performance of cooperatives using published data.

Course Outcomes

CO1: Explain the concepts of agricultural finance, principles of credit and credit analysis.

CO2: Outline social control and nationalization, lead bank schemes and crop loan systems.

CO3: Outline the meaning and scope of financial inclusion and schemes and agencies for financing.

CO4: Summarize the role of various international bodies and features of crop insurance and agricultural projects and functions and role of cooperatives in the agricultural sector.

UNIT – I: (3Hrs)

1. Agricultural Finance - Meaning, definition, nature and scope - Significance - Micro and macro finance - Capital and credit problems, need and their importance in Agriculture.

2. Credit - Meaning and definition - Classification of credit based on different criteria with examples.

3. Credit analysis - Economic feasibility tests - 3 R's of credit analysis - Returns to investment - Repayment capacity - Meaning, causes of poor repayment capacity of farmers, suggestions to improve repayment capacity - Risk bearing ability - Meaning, sources of risk, means to strengthen RBA.

4. Five Cs of credit – Character – Capacity – Capital - Condition and Common sense - Seven Ps of credit - Principle of Productive purpose - Principle of personality - Principle of productivity - Principle of phased disbursement - Principle of proper utilization - Principle of payment and Principle of protection.

UNIT – II: (4Hrs)

1. Social control and nationalisation - Meaning, objectives and their importance - Privatisation of commercial banks - Need and importance for institutional sources and structure of agricultural lending from different sources.

2. Lead bank scheme - Origin, objectives, functions - District credit plan - Regional Rural Banks (RRBs) - Origin, objectives, functions — RRBs in Andhra Pradesh.

3. Crop loan system - Objectives, importance, features of crop loan system - Scale of finance - Meaning and estimation and role of district level consultative committee - Term loans – Objectives and meaning of unit costs, fixation of unit costs and NABARD guidelines.

UNIT – III: (3Hrs)

- Financial inclusion - Meaning and importance - Micro finance - Meaning, importance, agencies providing microcredit banks, NBFCs, NGOs, and Govt. agencies - SHGs and their role in microfinance and bank linkages - Micro finance lending and control act in Andhra Pradesh - Objectives and important features.

2. Schemes for financing weaker sections - Differential interest rate (DIR) - Integrated rural development programme (IRDP) - Swarnajayanti gram swarozgar yojana (SGSY) - Self-help groups (SHGs) etc., Srinidhi, MUDRA.

3. Higher financing agencies - Reserve Bank of India (RBI) - Objectives and functions and role in agricultural development and finance. National Bank for Agricultural and Rural Development (NABARD) - Origin, functions, activities and role in agricultural development.

UNIT – IV: (3Hrs)

1. World Bank (WB) - Objectives and functions -World Bank group institutions - role and functions of International Bank for Reconstruction and Development (IBRD) - International Development Agency (IDA) - International Finance Corporation (IFC), MIGA, ISID.

2. Crop insurance - Meaning and its advantages and limitations in application -Agricultural insurance company of India - Objectives and functions - Indemnity - Meaning, premiums and claims - Prime Minister's Fasal Bhima Yojana (PMFBY) - Salient features - Weather based crop insurance - Salient features and its importance.

3. Agricultural project - Meaning, characteristics of agril. projects, project cycle and explanation of different phases of project cycle - Basic guidelines for preparation of project reports.

UNIT – V: (2Hrs)

1. Co-operation - Meaning, Scope, importance and definition - Principles - Objectives of cooperation, significance of cooperatives in Indian agriculture.

2. Brief history of cooperative movement development in India - Recent developments in Indian cooperative movement - short comings of Indian co-operative movement and remedies.

3. Agricultural Cooperative institutions in India - co-operative credit structure in India and Andhra Pradesh – Objectives and functions of state level (APCOB), district level (DCCB) and Village level (PACS) cooperative societies - Functions of marketing, consumer societies, multi-purpose cooperatives, farmers' service cooperative societies, dairy cooperatives - Andhra Pradesh mutually aided Co-operative Societies Act (1995) - Role of International Cooperative Alliance (ICA), National cooperative Union of India (NCUI), National Cooperative Development Council (NCDC).

References Text Books:

1. Johil S.S. and C.V. Moore. 1970. Essentials of Farm Financial Management. Today and Tomorrow Printers and Publishers, New Delhi.

2. John, J. Hamptron.1983. Financial Decision Making: Concepts, Problems and Cases, of India. New Delhi.

3. Mamoria, C.B. and R.D. Saksena. 1973. Co-operatives in India. Kitab Mahal, Allahabad, 4. Mamoria, C.B. and Saxena. Agricultural Problems in India. Kitab Mahal, Allahabad 5. Mukhi, H R. 1983. Cooperation in India and Abroad. New Heights Publishers, New Delhi.

4. Muniraj, R. 1987. Farm Finance for Development, Oxford & IBH Publishing Company Ltd., New Delhi,

5. Subba Reddy, S. and P. Raghuram. Agricultural Finance and Management. Oxford & Publishing Company Private Ltd., New Delhi, 2005

6. Subba Reddy, S., Raghu Ram., P., Sastry, T.V.N and Bhavani Devi, I. 2016. Agricultural Economics. Oxford & IBH Publishing Company Private Ltd., New Delhi.

8. Pandey, U.K. Agricultural Finance in India.

9. William, G. Murray and Nelson Aarson, G. Agricultural Finance. The Iowa State University Press, Ames, Iowa state University press Ames, IOWA.

10. www.rbi.org 12. www. nabard. Org www.wb.org

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

III SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** TIME:15HRS

AGRD 251 (1) **FARM MACHINERY & POWER** MARKS:100

SYLLABUS

Objectives

- To study about difference between EC engine and constructional details of IC engine.
- To study about Air cleaning and maintenance
- To study about secondary tillage implements and its constructional details

Course Outcomes

CO1: Explain the working principles of different farm engines.

CO2: Outline the ignition and power transmission system of I.C engines.

CO3: Summarize ploughing, sowing, plant protection, harvesting and threshing

equipment and seed cum fertilizer drills.

CO4: Explain dusters and tractor mounted equipments.

UNIT – I: **(3Hrs)**

1. Farm power – Source of different farm power, advantages and disadvantages.

2. Internal combustion engine - Different components and their functions - Working principle of four stroke and two stroke cycle engine - Comparison between diesel and petrol engine - Difference between four and two stroke engines.

3. Terminology related to engine power - IHP, BHP, FHP, DBHP, compression ratio, stroke bore ratio, piston displacement, and mechanical efficiency - Numerical problems on calculation of IHP, BHP, C.R., stroke bore ratio, piston displacement volume.

4. Fuel supply and cooling system of I.C. engine – Types, components and their functions, working principle of forced circulation cooling system.

UNIT – II: **(2Hrs)**

1. Ignition and power transmission system of I.C engine – Types, components and their functions, working principle of battery ignition system.

2. Lubrication system of I.C. engine – Types, purpose, components and their functions, working principle of forced feed system - Tractors classification, types, points to be considered in selection of tractors, estimating the cost of operation of tractor power.

3. Tillage - Primary and secondary tillage - M.B. plough – Functions, constructional features, operational adjustments and maintenance.

UNIT – III: (5Hrs)

1. Disc plough – Functions, constructional details, operational adjustments and maintenance.

2. Numerical problems on M.B. plough and disc plough.

3. Harrows – Types, functions, operation of disc harrows - Cultivators – Rigid and spring loaded tynes - Puddlers, cage wheel, rotovators - Intercultural implements – Hoes and weeders for dry and wetland cultivation.

UNIT – IV: (2Hrs)

1. Sowing equipment - Seed cum fertilizer drills – Types, functions, types of metering mechanisms, functional components, calibration - Paddy transplanters.

2. Harvesting equipment – Sickles, self-propelled reaper, alignment and registration - Combines, functions of combines.

3. Plant protection equipment – Types of sprayers, constructional features of knapsack sprayer, hand compression sprayer, foot sprayer, rocker sprayer and power sprayer, care and maintenance of sprayers.

UNIT – V: (3Hrs)

1. Dusters – Hand rotary and power operated dusters, care and maintenance of dusters.

2. Tractor mounted equipments for land development and soil conservation – Functions of bund former, ridger, and leveling blade.

3. Threshing equipment and principles of combine harvester

References Text Books

1. Jagadishwar Sahay - Elements of Agricultural Engineering.

2. Surendra Singh. Farm Machinery - Principles and Applications. ICAR Publication.

3. S.C. Jain and C.R. Rai. Farm Tractor – Maintenance and Repair. Standard Publishers, 1705- B, Nai Sarak, Delhi – 110006

4. Ojha, T. P. and Michael, A.M. Principles of Agricultural Engineering. Vol. I, Jain Brothers.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

III SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** TIME:30HRS

AGRD 251P (1) **FARM MACHINERY & POWER** MARKS:50

PRACTICAL SYLLABUS

OBJECTIVES:

- To study the difference between EC engine and constructional details of IC engine.
- To study about Air cleaning and maintenance
- To study about secondary tillage implements and its constructional details

Course Outcomes:

CO1: Explain Internal combustion engine, Different components and their functions

CO2: learn Ignition and power transmission system of I.C engine

CO3: Explain Sowing equipment, Seed cum fertilizer drills and sprayers

PRACTICALS:

1. Showing the difference between EC engine and constructional details of IC. **(3 hrs)**

2. Dismantling the IC engine and explaining the functional aspects of components. **(4hrs)**

3. Air cleaning and maintenance - Engine cooling and maintenance. (**4hrs)**

4. Familiarizing with the lubrication and fuel supply system of an engine. **(4rs)**

5. Familiarizing with clutch – Gearbox - Differential and final drive along with brake steering hydraulic control of tractor. **(3hrs)**

6. Familiarization with primary tillage implements like M. B. Plough, disc plough and its adjustments. **(3hrs)**

7. Study of secondary tillage implements and its constructional details -Emphasis on disc harrow, spike tooth harrow, blade harrow, rotavator, power harrow. **(3hrs)**

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
III SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** TIME:15HRS

AGRD 261 (1) **ECO-PHYSIOLOGY** MARKS:100

SYLLABUS

OBJECTIVES:

- To study about relation between environment and the functioning of the live

  Organisms
- To study about how life process depend on the environment at different levels.
- To study about connection between life process in the context.

Course Outcomes

CO1: Explain concepts and components of ecophysiology and its influence on crop distribution.

CO2: Outline the impact of different environments on biotic and abiotic components.

CO3: Distinguish between iconic and osmotic balance and types of competition in agriculture cropping.

CO4: Explain the scope of allelopathy and phyto-remediation in agriculture

CO5: Summarize the sources, effects of pollution, global warming on agricultural field crop productivity.

UNIT – I: **(4hrs)**

1. Ecophysiology – Introduction – Definition – Importance in agriculture and horticulture – Ecosystem – Definition of ecosystem, ecotypes and ecads – Biosphere and ecosystem – Sub divisions of biosphere – Pathways of energy in the biosphere – Concept of ecosystem – Components of ecosystem – Basic structure of ecosystem.

2. Different types of ecosystem – Freshwater, marine, forest and crop ecosystem – Energy in ecosystem – Productivity – Primary production – Secondary production – Types of food chains.

3. Global climates and crop distribution – Influence of climate on crop distribution (rice, wheat, maize, sorghum and sugarcane) – Important climatic regions of the world – Agro-climatic zones of India – Crop distribution in India and Andhra Pradesh.

4. Environment – Definition – Components – Biotic and abiotic environments – Biotic environment – Biotic factors and anthropic factors – Abiotic environment – Climatic, edaphic, physiographic and pyric factors – Climatic factors – Radiation – Effect of radiation on plant functions –Classification of ultraviolet (UV) radiation – Effects of UV-B radiation.

UNIT – II: **(3hrs)**

1. Abiotic environment – Climatic factors – Precipitation – Forms of precipitation – Effect of water deficit and water logging on plant processes – Temperature – Cardinal temperature – Effects of temperature on plant processes – Temperature injuries – High temperature and low temperature stress – Classification of plants based on heat resistance and cold resistance – Heat units.

2. Edaphic factors – Classification of plants based on adaptation to different soil types – Halophytes and salt stress tolerance mechanisms.

3. Physiographic factors – Altitude of the place, steepness of the slope, direction of mountain chain and exposure of the slope to light and wind – Effects of topographic factors on vegetation – Wind effect on physiological processes - Pyric factors – sources and type of fires – Effects of fire on vegetation and environment – management of fires and rejuvenation of crops.

UNIT- III: **(3hrs)**

1. Biotic factors – Herbivores (grazing effect), symbiosis (Mycorrhiza and Rhizobium associations), insectivorous plants, epiphytism and parasites - Anthropic factors – Industrialization – Shifting cultivation – Crop improvement.

2. Physiological approaches for climate resilient agriculture.

3. Competition – Ecological succession – Dominance and subordination – Types of competition – Inter-specific, intra-specific and intra-plant competition – Monoculture and polyculture – Multistoried cropping system – Mutual shading.

UNIT – IV: **(2hrs)**

1. Allelopathy – Definition – Concept – Sources of allelopathic chemicals in crop and weed species – Natural products identified as allelopathic chemicals – Mode of action – Scope for allelopathy.

2. Phyto-remediation – Definition – Concept – Applications in agriculture and industry.

3. Pollution – Air pollution – Sources – Physiological effects on plants and its Management - Water pollution – Sources – physiological effects on plants and its Management - Soil pollution – Sources – Physiological effects on plants and its Management

UNIT – V: **(3hrs)**

1. Global warming – Greenhouse effect – Causes of global warming – Methane, carbon dioxide, chloro fluoro carbons' (CFC), nitrous oxide (NO) gas and ozone – Impact of global warming on climate and agricultural productivity – Measures to reduce build-up of greenhouse gases.

2. Controlled environment – Purposes – Types – Designs of structure – Commercial applications.

3. Carbon dioxide fertilization – Definition – Concept – Importance – Sources Methods of CO2 fertilization – Effects on crop yields and limitations - Eco physiological models - Concept – Models for different environmental management.

References Text books:

- Agrwal, A. K. and Deo, P.P. 2013. Plant Ecology. Agrobios (India) Jodhapur
- Varshneya, M. C and Balakrishna Pillai, P. 2006. Textbook of Agricultural Meteorology. ICAR, New Delhi
- Lenka, S., Lenka, N.K., Kundu, S and Subba Rao, A. 2013. Climate change and Natural Resources Management, New India Publishing Agency, India
- Prasad and Kumar. 2010. Green House Management for Horticulture Crops. Agrobios, Jodhpur.
- Schulze, E.C., Beck, E and Muller-Hohenstein, K. 2005. Plant Ecology. Springer Science & Business Media, New York City.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

III SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** TIME:30HRS

AGRD 261P (1) **ECO-PHYSIOLOGY** MARKS:50

PRACTICAL SYLLABUS

Objectives:

· To study about relation between environment and the functioning of the live organisms

· To study about how life processes depend on the environment at different levels.

· To study the connection between life processes in the context.

Course Outcomes:

CO1: Explain about Basic principles of physiology and environment

CO2: Outline about control mechanism and environment.

CO3: Explain about impact of different environments on life processes and osmotic balance.

EXPERIMENTS:

1. Hydrophytes - Morphological and anatomical adaptations to Excess **(4hrs)**

2. Mesophytes - Morphological and anatomical adaptations to mesic conditions **(3hrs)**

3. Xerophytes - Morphological and anatomical adaptations to Water deficit **(4hrs**)

4. Effects of light and shade on crop growth **(3hrs)**

5. Influence of different soils on crop growth **(3hrs)**

6. Analysis of competition in crop plants **(3hrs)**

7. Effect of dust pollution on crop growth **(3hrs)**

8. Effect of soil pollution on crop growth **(3hrs)**

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

III SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** TIME: 15HRS

AGRD 271 (1) **PRINCIPLES OF PLANT PATHOLOGY-II** MARKS:100

SYLLABUS

OBJECTIVES

- To study about Pathogenesis
- To study about living entities that cause diseases in plants
- To study about mechanism by which the diseases causing agents

Course Outcomes

CO1: Explain the history, concepts, patterns of survival and dispersal of plant pathogens.

CO2: Outline the phenomenon of infections and pathogenesis.

CO3: Summarize the principles of plant disease management and different defence mechanisms.

CO4: Explain methods of eradication for phytopathogens

UNIT – I: **(4Hrs)**

1. History of Plant Pathology with special reference to Indian work- contributions of Anton de Bary, Woronin, Oscar Brefeld, Marshal Ward, Millardet, Butler, Mundkur, Stakman, Dastur, Mehta, Sadasivan.

2. Terms and concepts used in plant Pathology - disease - disorder - pathogen - parasite - pathogenicity - pathogenesis - sign - symptom - syndrome - biotroph - hemibiotroph - perthotroph (necrotroph) - inoculum - inoculum potential - infection - incubation period - predisposition - hypersensitivity - epidemic - endemic and sporadic diseases.

3. Survival of plant pathogens - kinds of inoculum - primary and secondary inoculum - pattern of survival - infected host (main host, alternate host and collateral host) - saprophytic survival outside the host (soil, root inhabitants and rhizosphere colonizers) dormant spores or structures (seed borne, soil borne and on infected plant parts).

4. Dispersal of plant pathogens - active dispersal - seed, soil and plant parts, passive dispersal - air, water, members of animal kingdom (agents with examples), fungi and phanerogamic parasites.

UNIT - II: **(2Hrs)**

1. Phenomenon of infection - process of infection - pre-penetration, penetration and post penetration. Pre-penetration in fungi (spore germination, germ tube growth, formation of specialized structures like appressorium and rhizomorphs), bacteria and virus. Penetration - indirect penetration through wounds or natural openings like stomata, hydathodes and lenticels - direct penetration through plant surface (cutinized and non-cutinized surfaces) by chemical or mechanical methods. Post penetration - colonization of the host.

2. Pathogenesis - role of enzymes, toxins, growth regulators and polysaccharides in plant diseases with examples. Enzymes - cutinases, pectinases, cellulases, lignases, proteases and lipases.

3. Toxins - pathotoxins, phytotoxins and vivotoxins - selective (host specific) and non-selective (host non-specific) toxins. Growth regulators - growth promoting substances (auxins, gibberellins and cytokinins) and growth inhibiting substances and polysaccharides.

UNIT – III: (2 Hrs)

1. Defense mechanisms in plants - pre-existing structural defense mechanisms - waxes, thick cuticle and epidermal cell wall - structure of natural openings, internal structural barriers – postinfectional structural defense - histological defense (cork layer, abscission layer, tyloses and gum deposition) and cellular defense (hyphal sheathing) structures.

2. Biochemical defense mechanisms - pre-existing biochemical defense mechanisms - inhibitors released by the plant in its environment (protocatechuic acid and catechol) and inhibitors present in the plant cell (phenolic compounds - chlorogenic acid) – post infectional defense mechanisms - phytoalexins, hypersensitive reaction - defense through plantibodies.

3. General principles of plant disease management - importance - general principles - avoidance of the pathogen (selection of pathogen free propagating material and seed, selection of field, choice of time of sowing and disease escaping varieties), - exclusion - plant quarantine and inspection, quarantine rules and regulations.

UNIT - IV: (3 Hrs)

1. Eradication - cultural methods of eradication (rouging, eradication of alternate and collateral host, crop rotation, manure and fertilizer management, mixed cropping, sanitation, summer ploughing, soil amendments, time of sowing, seed rate and plant density, irrigation and drainage).
2. Physical methods of eradication- solarization and hot water treatment; Biological methods - role of biological control - mechanisms - competition, antibiosis, hyperparasitism, Systemic Acquired Resistance (SAR) and Induced Systemic Resistance (ISR).
3. Important fungal and bacterial biocontrol agents (Trichoderma spp, Psuedomonas fluorescens, Bacillus subtilis and Ampelomyces quisqualis) - Plant Growth Promoting Rhizobacteria (PGPR) against phytopathogens.

UNIT – V: (3 Hrs)

1. Contact and systemic fungicides against lower fungi, downy mildews, powdery mildews, rusts, smuts, coloured fungi, leaf spots and blights. Chemicals for soil drenching.

2. Mode of action and Formulations of fungicides, Antibiotics and their formulations.

3. Introduction to botanicals and other non-chemical preparations used in the disease management in organic and natural farming systems.

References text books

- Agrios, G.N. 2005.Plant Pathology. Elsevier Academic Press, New York.
- Chaube, H.S. and Ramji Singh. 2001. Introductory Plant Pathology. International Book Distribution Co., Lucknow. 136
- Mehrotra, R.S. 1980. Plant Pathology. Tata McGraw-Hill Publishing Co. Ltd., New Delhi.
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- Vidyasekharan, P. 1993. Principles of Plant Pathology. CBS Publishers and Distributors,New Delhi.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
III SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** TIME:30HRS

AGRD 271P (1) **PRINCIPLES OF PLANT PATHOLOGY-II** MARKS:50

PRACTICAL SYLLABUS

OBJECTIVES:

· To study Pathogenesis

· To study about living entities that cause diseases in plants

· To study about mechanism by which the diseases causing agents

COURSE OUTCOMES:

CO1: Explain about Survival of plant pathogens and kinds of inoculum primary and secondary inoculum, pattern of survival

CO2: Outline about Toxins - pathotoxins, phytotoxins and vivotoxins , selective (host specific) and non-selective (host non-specific) toxins

CO3: Explain about Dispersal of plant pathogens - active dispersal

EXPERIMENTS:

1. Acquaintance with various laboratory equipment. **(3hrs)**

2. Preparation of culture media Potato Dextrose Agar (PDA) for fungi and Nutrient Agar (NA) for bacteria. **(3hrs)**

3. Isolation of fungal and bacterial pathogens. **(3hrs)**

4. Preservation of disease samples - dry and wet methods. **(3hrs)**

5. Demonstration of Koch's postulates for fungi. **(3hrs)**

6. Demonstration of Koch's postulates for bacteria. **(3hrs)**

7. Study of different groups of fungicides and antibiotics. **(3hrs)**

8. Preparation of fungicides - Bordeaux mixture, Bordeaux paste and cheshunt Compound. **(3hrs)**

9. Methods of application of fungicides - soil application. **(3hrs)**

10. Methods of application of fungicides - seed treatment. **(3hrs)**

SCHEME OF EVALUATION

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

III SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** TIME:30HRS

AGRO 201(2) **CROP PRODUCTION TECHNOLOGY – I** MARKS:100

SYLLABUS

OBJECTIVES:

- To study about the understand the principles and practices that underpin modern crop practises
- To study about Optimize and manipulate crop scheduling.
- To study Exploit understanding in plant sciences.

Course Outcomes:

CO1: Explain importance and special features of cereal crops in Andhra Pradesh.

CO2: Outline the agronomic conditions for the cultivation of agricultural cereal crops.

CO3: Summarize agronomic conditions to grow millet crops.

CO4: Discuss the agronomic conditions and characteristics of various agricultural field crops. Necessary for the cultivation of pulses and lentils.

UNIT – I: **(6Hrs)**

1. Cereals – Importance and special features of cereals - Rice- Origin - geographical distribution – nutritional value – area, production and productivity in India and Andhra Pradesh

2. Economic importance - soil and climatic requirements

3. Classification of rice plant types - growth Stages of rice -different types of rice ecosystems

4. Land Preparation –physico – chemical and biological changes under submerged soils

5. Crop establishment techniques in rice - Climate resilient technologies

6. Nutrient management with special emphasis on nitrogen dynamics, micro nutrients -INM

UNIT – II: **(6hrs)**

1. Water management in rice under different rice ecosystems

2. Weed management including weed management in rice nurseries – IWM

3. Harvesting -Yield attributes - yield - post harvest operations - milling of rice

4. Value added products of rice – export potential - rice grain classification, cropping systems in rice

5. Wheat- Origin - geographical distribution - area, production and productivity.

6. Classification and economic importance of wheat, crop growth stages, varieties, Land preparation-seed and sowing -nutrient management, irrigation

7. Harvesting -yield attributes - post harvest operations – storage, crop rotation, mixed cropping, cropping systems, By product utilisation.

UNIT – III: **(6hrs)**

1. Barley – Origin-classification, area-distribution, climate,soil,season, seed rate -spacing, varieties, Nutrient, water, weed management, Harvest details.

2. Maize- Origin- distribution - importance - area, production and productivity in India and Andhra Pradesh-soil, seasons, growth stages, Classification of maize

3. Land Preparation – zero tillage - seeds and sowing - intercultivation, manures and fertilisers, climate resilient technologies.

4. Harvesting - yield attributes – yield - shelling , maize as fodder, value addition.

5. Millets-importance, climate resilient technologies. constraints and strategies for increasing the production of millets - climate resilient technologies

6. Jowar or sorghum- Origin - importance - area-distribution, adaptations, soils, seasons , majar jowar growing zones, growth stages, seeds-sowing, spacing, Nutrient management, harvesting and threshing, yield attributes, value addition.

UNIT – IV: **(6hrs)**

1. Pearl millet – Origin - distribution - adaptation, soil, land preparation, seasons,seeds, sowing, nutrient management.

2. Harvesting-yield -yield-attributes, cropping systems, varieties.

3. Finger millet- importance, origin, area-production, adaptation, soil, land preparation, season, seeds-sowing, spacing, growth-stages, manures fertilizers, irrigation, harvesting, yield-yield attributes, varieties, cropping systems, value added products of finger millet.

4. Proso millet: origin, area-distribution, cimate requirement, soil, land preparation, seasons,seeds, manures, irrigation, intercultivation, Harvesting, threshing, yield- varieties.

5. Pulses- importance, area-production-productivity, agronomic-genetic-physical constraints, productivity increasing strategies, pulses as climate resilient crops.

7. Redgram- origin, distribution, soils, climate, seasons, seeds-spacing, manures-fertilizers, weed management, harvesting, yield, cropping systems.

UNIT – V: **(6hrs)**

1. Greengram – Origin - distribution - economic importance - soil, climate, land-preparation, varieties, seasons, fertilizers, water-weed management, production constraints, harvesting-threshing,-processing, yield, cropping systems.

2. Blackgram – Origin - distribution, area-production-productivity, importance, soil-climatic requirements, varieties, constraints, seeds-spacing, fertiliser application, irrigation, weed management, harvesting-threshing, yield, cropping systems.

3. Bengalgram - Origin - economic importance, area-production-productivity, soil, climate, varieties, seeds-sowing, fertilizers, irrigation, weed control, harvesting, threshing, cropping systems, intercropping.

4. peas: origin, distribution, soil- climate, season-varieties, seed rate, spacing, weed management, cropping systems, yield, types,Economic uses of peas.

Lentil: origin, distribution, classification, soil-climate, varieties, land preparation, seed rate and sowing, method of sowing, water and nutrient, weed management, harvesting, yield , Economic uses of lentil.

5. Horsegram- origin, area-production-productivity, soil,climate,spacing, fertilizers, irrigations, weed control, cropping system, harvesting and storages, constraints , importance.

6. Cowpea- Origin, area-production, soil-climate, varieties, seed rate- spacing, growth -stages, fertilisers-biofertilizers, water-weed management, cropping systems, harvesting, and post-harvest care, yield.

REFERENCES TEXT BOOKS:

- Rajendra Prasad. 2006. Text book of field crops production. ICAR, New Delhi.
- Reddy, S.R. and Reddi Ramu. 5th edition. 2016. Agronomy of field crops. Kalyani publishers, Ludhiana.
- Gururaj hunsigi and Krishna, K.R. 2007. Scientific field crop production. Oxford &IBH Publishing Co.Pvt.LTD.
- De Datta, S.K.1981. Principles and practices of rice Production. John Wiley and Sons, New York.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

III SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** TIME: 30HRS

AGRO 201P (1) **CROP PRODUCTION TECHNOLOGY – I** MARKS:50

PRACTICAL SYLLABUS

OBJECTIVES:

· To study about the understand the principles and practices that underpin modern

Crop practises

· To study about Optimize and manipulate crop scheduling.

· To study Exploit understanding in plant sciences.

Course Outcomes:

CO1: Explain about Introduction and development of agriculture.

CO2: Outline about Nutrient management with special emphasis on nitrogen dynamics, micro nutrients - INM

CO3: learn about Harvesting -Yield attributes - yield - post harvest operations.

EXPERIMENTS:

1. Raising of rice nurseries including SRI nursery for mechanical transplanting **(3 hrs)**

2. Transplanting of rice **(3 hrs)**

3. Identification of seeds /crops and calculation of seed rate **(3 hrs)**

4. Land preparation and layout of student plots **(3 hrs)**

5. Sowing of crops in student plots **(3 hrs)**

6. Study of the effect of seed size on germination and seedling vigour **(3 hrs)**

7. Identification and management of weeds in cereals and pulses **(3 hrs)**

8. Fertilizer application (top dressing and foliar feeding of nutrients) **(3 hrs)**

9. Agronomic characters of cereal crop varieties **(3 hrs)**

10. Agronomic characters of millet crop varieties **(3 hrs)**

SCHEME OF VALUATION:

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

III SEMESTER **SKILL COURSE** Time:15hrs/week

AMRD 202 (2) **AGRICULTURE MICROBIOLOGY** Marks:50

OBJECTIVES:

- To understand introduction to microbiology and fermentation.
- To understand microbial nutrition.
- To explain biological nitrogen cycle.

Course Outcomes

CO1: Understand about Nutritional media and their preparations.

CO2: Isolation of azotobacter from soil.

CO3: Isolation of Rhizobium from legume root nodule.

CO4: Staining and microscopic examination of microbes.

UNIT- I: (3 Hrs.)

1. Introduction- Definition- The hidden world of microbiology- How microbes evolved on earth- General classification of microbes-Microorganisms and principles of microbiology- Scope of microbiology. Brief History of microbiology - Spontaneous generation theory- Contributions of Antony Van Leeuwenhoek Francesco Redi- Lazzaro Spallanzani- Franz Schulze- Schroder and Von Dusch- Louis Pasteur- John Tyndall.
2. Role of microbes in fermentation-Contributions of Cagnaird Latour-Theodor Schwann, F.Kutzing-Louis Pasteur - Germ theory of disease - Contribution of Hippocrates-Louis Pasteur- Robert Koch - Pure Culture Methods- Joseph ListerRobert Koch- Beijerinck-Winogradsky- Francois Appert-Schroder and Von DushJohn Tyndall.
3. Protection against infection-Contributions of Edward Jenner- F. Loeffler- Behirng Kitasasto- Louis Pasteur - Applied aspects of Microbiology- Agricultural microbiology-Industrial microbiology-Food Microbiology - Medical microbiology – Water Microbiology - Geochemical Microbiology-Pollution microbiology – Air microbiology – Exo-Microbiology - Microbial biotechnology.
4. Morphological types of Bacteria , Bacteria cell Structure- External and internal cell structures-Differences between Prokaryotes and Eukaryotes.

UNIT- II: (3 Hrs.)

1. Microbial Nutrition- Autotrophy - Chemoautotrophy- Photoautotrophy
2. Heterotrophy – Metabolic pathways-Glycolysis-HMP-ED-TCA cycle.
3. Growth of Microorganisms - Cell Division - Growth cycle of bacteria [Lag phase, Log phase, Stationary and Death phase]- Generation time- Growth rate- Growth yield- Synchronous - Diauxic growth.

UNIT- III: (3 Hrs.)

1. Bacterial genetics- Genetic recombination- Transformation- ConjugationTransduction- Plasmids-Transposon.
2. Role of microbes in fertility of soils and plant growth - Rhizosphere- RhizoplanePhyllosphere-Phylloplane - Microflora- Carbon cycle- Carbon dioxide fixation.

3. Nitrogen cycle - Mineralisation- Immobilisation- Nitrification- DenitrificationNitrogen Fixation - Phosphorus cycle, phosphorus solubilisation – Oxidation – Reduction - Sulphur cycle-Oxidation and reduction.

UNIT- IV: (3 Hrs.)

1. Biological nitrogen fixation - Symbiotic- Associative- Asymbiotic- Nitrogen fixation In Azolla - Blue green algae - Actinorhizal symbiosis - Frankia, Phosphate solubilizing microorganisms - Bacillus - Pseudomonas- Mycorrhiza for Phosphorous uptake.
2. PGPR Organisms - Bacillus – Pseudomonas – Azotobacter – Azospirillum - Rhizobium -Microbes in human welfare.
3. Types of fermentations - Batch - Batch fed- Continuous - Solid State Fermentations, Common microbial fermentations-Alcohol- Lactic acid- Butyric acid- Formic acid - Butanediol- Propionic Acid- Mixed Acid - Fermentation technology- Alcoholic beverages production.

UNIT-V: (3 Hrs.)

1. Biofertilizers (Bacterial-Cyanobacterial-Fungal) production technology- Silage Production Technology.
2. Biopesticides- Viruses (Nucleo polyhedrosis virus - Granular viruses) – Bacteria (Bacillus thuringiensis, Bacillus papilliae) - fungi (Beauveria - Verticillium) - Protozoa (Malameba locustae-Mattesia Spp)-Mode of action.
3. Biofuel Production- Biodegradation - Biogas, Biomanures and Composting Technologies.

References:

- Microbiology. Pelczar, J.r., M.J.E.C.S.Chan and Krieg, N.R. (5th Ed.) 2015. McGraw Hill Publishers, New York.
- Microbiology. Prescott, L.M., Harley, J.P. and Klein, D.A. (9th Ed.) 2014. McGraw Hill Publishers, New York.
- Brock Biology of Microorganisms.Madigan, M.,Martinko, J.M and Parker, J. (14Ed.) 2015. Prentice hall of India Pvt Ltd., New Delhi.
- Soil Microbiology: Subba Rao, N.S. (4th Ed.) 2014. Oxford and IBH Publishing Company Pvt. Ltd., New Delhi.
- Microbiology A Laboratory Manual: James, C and Natile, S. (10th Ed.) 2014. Pearson India Education Services Pvt. Ltd., South Asia.
- Experiments in Microbiology, Plant Pathology and Biotechnology. Aneja, K.R.2011. New Age International (P) Ltd., Publishers, New Delhi.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

III SEMESTER	**SKILL COURSE**	Time:15hrs/week
BCA 202 (2)	**BASIC COMPUTER APPLICATION**	Marks:50

OBJECTIVES:

- To create, capture, access and disseminate information to achieve a more productive and sustainable.
- To use of agricultural resources.
- To encourage non-profit, research professionals and business professionals.

Course Outcomes

CO1: Explain Windows explorer- Creating folder - Copy and paste functions - Control panel Notepad - WordPad etc.

CO2: Summarize MS word - Creating a document, saving and editing

CO3: Discuss Use of options from tool bars – Format - Insert and tools (Spelling and Grammar) - Alignment of paragraphs and text.

CO4: Explain to Creating a table - Merging of cells - columns and row width - Formats etc.

UNIT- I: **(2 Hrs.)**

1. Introduction to computers- Advantages- Disadvantages- Applications - Anatomy of Computers- Input / output devices -Memory Concepts - Units of Memory - RAM – ROM – PROM – EPROM - EAPROM - Cache Memory.

2. Operating system - Definition and types - WINDOWS OS – Features – Desktop – Icons etc.

UNIT- II: **(2 Hrs.)**

1. Applications of MS-Office - MS- Word - Creating - Editing and formatting a document.

2. MS Word - Features of good word processor - Mail merge – Drop cap- Auto text.Track changes – Equation editor etc.

UNIT- III: **(2 Hrs.)**

1. MS- Excel - Data presentation, Tabulation – Merging of cells and graph creation - Mathematical expressions.
2. MS- Excel - Data analysis tool pack – Pivot table and graph etc.

UNIT – IV: **(2 Hrs.)**

1.MS Access – Database - concepts and types - creating database - Uses of DBMS in agriculture.

2**.** MS Access - Objects of data base – Types of fields etc.

UNIT-V: (2 Hrs.)

1. Internet and World Wide Web (WWW) – Concepts - Components and creation of web.
2. HTML - XML coding.

References:

1. John Walkenbach, Herb Tyson, Michael R. Groh, Faithe Wempen, Microsoft Office 2010 Bible.
2. Bangia,Learning Ms Office 2010.
3. Prof. Satish Jain and M. Geetha, MS-Office 2010 Training Guide.
4. Johnson, Microsoft Office 2010.....on Demand.
5. Kate Shoup, Microsoft Office 2010.
6. Melanie Gass, It's All about You! Office 2010.
7. Nancy Conner and Matthew MacDonald, Office 2010: The Missing Manual.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
III SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** TIME: 15HRS

HORD 281 (1) **PRODUCTION TECHNOLOGY FOR VEGETABLES AND SPICES** MARKS:100
SYLLABUS

OBJECTIVES:

- To study about production technology of vegetables.
- To know importance of vegetables crops
- To understand the scientific cultivation methods of vegetables.
- To study classification of vegetables

Course Outcomes

CO1: Classify and explain the importance of vegetables in human nutrition and national economy.
CO2: Outline the agronomical practices for vegetables.
CO3: Summarize physiological disorders of vegetables.
CO4: Explain disease and pest control and in vegetables and seed production techniques.

THEORY

UNIT – I:

1. Importance of vegetables in human nutrition and national economy – Classification of vegetables - 1) Botanical 2) Based on Hardiness 3) Parts Used 4) Method of culture 5) Season.

2. Tomato- Botanical Name – Family – Origin – Area – Production- Improved varieties and cultivation practices such as time of sowing - Sowing - Transplanting techniques - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield - Storage - Physiological disorders - Disease and pest control and seed production.

3. Brinjal and Chilli - Botanical name – Family - Origin - Area - Production - Improved varieties and cultivation practices such as time of sowing - Sowing - Transplanting techniques- Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield - Storage-Disease and pest control and seed production.

UNIT – II:

1. Okra - Botanical name – Family - Origin - area - Production - Improved varieties and cultivation practices such as time of sowing - Sowing - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield - Storage - Disease and pest control and seed production.

2. Cucurbits – Flowering, sex expression, sex ratio -Ridge gourd, Bitter gourd, Bottle gourd- Botanical name – Family - Origin - Area - Production - improved varieties and cultivation practices such as time of sowing - Sowing - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield - Storage - Physiological disorders - Disease and pest control and seed production.

UNIT – III:

1. Melons – Watermelon and Muskmelon - Botanical name – Family - Origin - Area - Production - Improved varieties and cultivation practices such as time of sowing - sowing - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield- Storage - Physiological disorders - Disease and pest control and seed production.

2. Cole crops- Cabbage and Cauliflower -Botanical name – Family - Origin - Area - production-Improved varieties and cultivation practices such as time of sowing - sowing - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield – Storage - Physiological disorders - Disease and pest control and seed production.

UNIT – IV:

1. Peas and beans (French bean, Dolichos) - Botanical name – Family - Origin - Area - Production - Improved varieties and cultivation practices such as time of Sowing - sowing - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield –Storage - Physiological disorders - Disease and pest control and seed production.

2. Root crops (Carrot and Radish) - Botanical name – Family - Origin - Area - Production - Improved varieties and cultivation practices such as time of sowing - Sowing - Planting distance - Fertilizer requirements - Irrigation - Weed management - Harvesting - Yield - Storage - Physiological disorders (splitting, forking and cavity spot) - Disease and pest control and seed production.

UNIT- V:

1. Bulb crops – Onion and Garlic – Botanical name – Family – Origin – Area – Production – Improved varieties and cultivation practices such as time of sowing – Sowing – Planting distance – Fertilizer requirements – Irrigation – Weed management – Harvesting – Yield – Storage – Physiological disorders – Disease and pest control and seed production.

References text books

- Pranab Hazra, A. Chattopadhyay, K. Karmakar and S. Dutta. 2010. Modern Technology in Vegetable Production. New India Publishing Agency, New Delhi.
- Neeraj Pratap Singh, .2007. Basic Concepts of Vegetable Science. International Book Distributing Co. New Delhi. Academic Press, New Delhi.
- Nempal Singh, Singh, D.K., Singh, Y.K. and Virendra Kumar. 2006. Vegetable Seed Production Technology. International Book Distributing Co. Lucknow.
- Prem Singh Arya and S. Prakash 2002. Vegetables Growing in India. Kalyani publishers, New Delhi 5. Bose, T. K, Kabir, J., Maity T. K., Parthasarathy V. A.,

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
III SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** TIME:30HRS

HORD 281P (1) **PRODUCTION TECHNOLOGY FOR VEGETABLES AND SPICES** MARKS:50
PRACTICAL SYLLABUS

OBJECTIVES:

1. To study about production technology of vegetables .
2. To know importance of vegetables crops
3. To understand the scientific cultivation methods of vegetables .

COURSE OUTCOMES

CO1: Explain about origin, and area climate, soil, improved varieties and cultivation practices

CO2: Classify about Physiological disorders Disease and pest control and seed production.

CO3: learn about transplanting techniques, Planting distance, Fertilizer requirements Irrigation, Weed management, Harvesting, Yield, Storage

EXPERIMENTS:

1. Identification of vegetables and their seeds.
2. Study of morphological characters of different vegetables.
3. Physiological disorders of vegetable crops
4. Intercultural operations in vegetable crops.
5. Fertilizers application methods.
6. Seed extraction methods in vegetables.
7. Storage of various crops.
8. Visit and identify the diseases and disorders in vegetables.
9. Post-harvest Management of Vegetables and leafy vegetables.
10. Visit to KVK.

References text books :

1. Pranab Hazra, A. Chattopadhyay, K. Karmakar and S. Dutta. 2010. Modern Technology in Vegetab Production. New India Publishing Agency, New Delhi.
2. Neeraj Pratap Singh, .2007. Basic Concepts of Vegetable Science. International Book Distributing Co. New Delhi. Academic Press, New Delhi.

3. Nempal Singh, Singh, D.K., Singh, Y.K. and Virendra Kumar. 2006. Vegetable Seed Production Technology. International Book Distributing Co. Lucknow.

4. Prem Singh Arya and S. Prakash 2002. Vegetables Growing in India. Kalyani publishers, New Delhi 5. Bose, T. K, Kabir, J., Maity T. K., Parthasarathy V. A., and

5. Som M. G., 2002. Vegetable Crops Vol. II & III Naya Prokash, Kolkata.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

III SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** TIME: 15HRS

HORD 282 (1) **PRODUCTION TECHNOLOGY OF ORNAMENTAL CROPS &**
w.e.f 2024-2025 (23AK Batch) **LANDSCAPING** MARKS:100
SYLLABUS

OBJECTIVES:

- To know importance of landscaping and making place aesthetically
- To understand the scientific cultivation methods of lawn
- To know about various ornamental plants

Course Outcomes

CO1: understand the importance and research institutes in our country,explain the importance of Ornamental crops
CO2: understand about landscaping
CO3: to beautify the garden and garden types
CO4: understand principles of landscaping

UNIT – I:

1. Definition of Ornamental Horticulture – Importance of Ornamental Horticulture (gardening) – History of gardening.
2. Definition of landscape and landscaping – Historical background of landscaping – Principles of landscape gardening – Initial approach – Axis – Focal Point – Mass effect – Unity – Space – Divisional Lines – Proportion and Scale – Texture – Time and Light – Tone and Colour – Mobility – Rhythm – Balance – Harmony – Style.
3. Garden components or features –Garden walls – Fences and Gates – Steps – Garden Drives and Paths – Arches and Pergolas – Screens – Bridges – Garden components or features – Hedges and Edges – Flower bed – Borders – Carpet bedding.

UNIT – II:

1. Types of garden – Formal – Informal – Wild Garden – Styles of garden in the world – Mughal Garden –Features of English – Italian – French – Persian Gardens – Japanese Garden – Types of Japanese Garden – – Features of Japanese Garden .
2. Lawn – Selection of Grass – Bermuda grass – Korean grass – Poa grass – Fescue grass – Kentucky blue grass - Grasses for shady areas – Site Selection – Soil – Preparation of soil – drainage – digging – manuring and grading – Methods of planting – Sowing of Seeds – Dibbling – Turfing – turf

plastering – Bricking – Planting on Polythene – Maintenance of lawn – Mowing – Rolling – Sweeping – Scraping – Raking

UNIT – III

1.Ornamental and shady Trees – Definition – Classification based on purpose with suitable examples.Shrubs – Definition – Utility (aesthetic values) – Classification with suitable examples – Herbaceous perennials – Definition – Introduction – Classification with suitable examples Climbers – Definition – Climbers – twiners – ramblers – creepers – Utility (aesthetic values) – Classification with suitable examples Landscaping – cities and towns – Road side plantation – Planting trees in colonies – Land scaping City parks – Large – medium – small parks – pleasure grounds – Examples of ornamental shade and flowering trees for town roads.

2. Floral Ornaments – Garlands – Floral crowns – Hair decoration – Rangoli – Floral Bouquets – Buttonholes – Floral arrangement – Western style – Principles of Design viz., – Emphasis – Balance – Proportion – Rhythm – Harmony – Unity – Elements of Design viz., – Line – Form – Texture – Colour

UNIT – IV:

1. Japanese floral arrangement – Ikebana – Moribana – Nageire – Jiyu-bana-Zen'ei-ka – Zen'eibana-Morimono – Materials required – General rules.

UNIT – V:

1. Bonsai – Definition – Criteria for selecting plants – Examples – Classification of Bonsai – Upright (formal and informal) – Winding – Winding – Semi-cascadecascade – Clasped to stone – Containers (pots) and Media – Potting and Re-potting – Training – Pruning and Pinching (Shoot, leaf and root) – Watering – manuring – Defoliation – Mame Bonsai.

References text books

- Bose, Chowdhury and Sharma.1991.Tropical Garden Plants in colour .Horticulture and allied publishers, 3D Madhab Chatterjee street Kolkata. K.V.Peter.2009
- .Ornamental plants. New India publishing agency, Pitampura, New Delhi. Richard Bird. 2002. Flowering trees and shrubs. Printed in Singapore by Star Standard Industries pvt. Ltd.
- Bimaldas Chowdhury and Balai Lal Jana.2014.Flowering Garden trees. Pointer publishers, Jaipur. India. Arora, J.S. 2006. Introductory Ornamental Horticulture.
- Kalyani Publishers, Ludhiana Randhawa, G.S. Amitabha Mukhopadhyay, 2004. Floriculture in India. Allied Publishers Pvt. Ltd., New Delhi. Bose, T.K. Mukherjee, D. 2004. Gardening in India. Oxford & IBH Publishers.
- Chadha, K.L. and Chaudhary, B. 1986. Ornamental Horticulture in India. Publication and Information division. ICAR, New Delhi.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
III SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** TIME:30HRS

AGRD 282P (1) **PRODUCTION TECHNOLOGY OF ORNAMENTAL CROPS & LANDSCAPING** MARKS:50
PRACTICAL SYLLABUS

OBJECTIVES:

- To know importance of landscaping and making place aesthetically
- To understand the scientific cultivation methods of lawn
- To know about various ornamental plants

COURSE OUTCOMES:

CO1: Students will be able to understand the importance and research institutes in our country, explain the importance of Ornamental crops

CO2: Students will understand about landscaping

CO3: How to beautify the garden and garden types

CO4: The students will understand principles of landscaping

EXPERIMENTS

1.Identification and description of trees and shrubs

2. To study sowing and seed bed preparation

3. Training and Pruning of Ornamentals

4. Protected structures and their maintenance.

5. Intercultural operations in flowers and MAP.

6. Planning and layout of Garden .

7. Lawn establishment.

8. Bonsai Preparation.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

IV SEMESTER **AGRICULTURE & RURAL DEVELOPMENT** TIME:30HRS
AGRD 202 (2) **CROP PRODUCTION TECHNOLOGY–II** MARKS:100

SYLLABUS

Objectives

· To study about Land preparation and layout of plots
· To study about Different types of sowing methods
· To Identify plant characteristics of oil seeds, fiber, sugar crops and fodder crops

Course Outcomes

CO1: Explain the cultivation of oil seed crops and their importance in the Indian economy.
CO2: Outline the cultivation of fibre crops and their importance in the Indian economy.
CO3: Summarize agronomical practices for sugar and tuber crops and their contribution to the Indian economy.
CO4: Discuss farming practices for tobacco crops and their significance in the Indian economy and forage crops and their importance.

UNIT – 1: (6 Hours)

1. Importance of oilseed crops- edible and non – edible oils – nutritional value importance in Indian economy- constraints in oilseed production.
2. Need for improvement of productivity and production of oilseeds -climate resilient technologies- Groundnut – Origin - geographical distribution -area, production and productivity in India and Andhra Pradesh- economic importance
3. Soil and climatic requirements - types - growth stages - land Preparation -seeds and sowing- seed treatment-seed rate-spacing-season-time and method of sowing varieties
4. Water management -weed management- yield attributes –yield- harvesting, postharvest operations- quality considerations -cropping systems – value addition in groundnut. 5. Soybean-Origin - geographical distribution and productivity in India and Andhra Pradesh -
5. Economic importance- soil and climatic requirements Land preparation - seeds and sowing seed viability - seed treatment-seed rate spacing-season-time and method of sowing- varieties -nutrient management-water management
6. Sunflower – Origin - geographical distribution - area, production and productivity in India and Andhra Pradesh - economic importance- soil and climatic requirements Land preparation - seeds and sowing-seed treatment-seed rate-spacing-season-time and method of sowing varieties -nutrient management-water management-weed management - yield attributes – yield- harvesting– post harvest operations-quality considerations – seed production-seed setting problems and measures-cropping systems.

UNIT – II : (6 Hours)

1. Sesame – Origin - geographical distribution - area, production and productivity in India and Andhra Pradesh - economic importance- soil and climatic requirements Land preparation - seeds and sowing-seed treatment-seed rate-spacing-season-time and method of sowing varieties - nutrient management-water management- weed management yield attributes – yield- Harvesting – post harvest operations-Quality considerations – cropping systems.
2. Rapeseed and mustard – Origin - geographical distribution - area, production and productivity in India and Andhra Pradesh - economic importance- soil and climatic requirements-Land preparation - seeds and sowing- seed treatment-seed rate spacing-season time and method of sowing- varieties.
3. Nutrient management- water management- weed management yield attributes – yield Harvesting – post harvest operations- quality considerations – cropping systems.
4. Safflower – Origin - geographical distribution - area, production and productivity in India and Andhra Pradesh - economic importance- soil and climatic requirements Land preparation - seeds and sowing-seed treatment-seed rate-spacing-season time and method of sowing varieties - nutrient management-

water management weed management - yield attributes – yield- harvesting – post harvest operations quality considerations – cropping systems.

5. Castor – Origin - geographical distribution - area, production and productivity in India and Andhra Pradesh - economic importance- soil and climatic requirements Land preparation - seeds and sowing- seed treatment-seed rate-spacing-season time and method of sowing varieties –nipping- nutrient management- water management- weed management - yield attributes –yield- harvesting – post harvest operations- quality considerations – cropping systems.
6. Linseed– Origin - geographical distribution - area, production and productivity in India and Andhra Pradesh - economic importance- soil and climatic requirements Land preparation - seeds and sowing- seed treatment-seed rate-spacing-season pyra /utera, time and method of sowing- varieties – nutrient management- water management- weed management - yield attributes –yield- harvesting – post harvest operations- quality considerations – cropping systems.
7. Niger - Origin - geographical distribution - area, production and productivity in India and Andhra Pradesh - economic importance- soil and climatic requirements Land preparation - seeds and sowing- seed treatment-seed rate-spacing-season time and method of sowing varieties - nutrient management- water management weed management - yield attributes – yield- harvesting – post harvest operations quality considerations – cropping systems. Fibre crops: Cotton, Jute and Mesta

UNIT – III: (6 Hours)

1. Cotton- Origin - geographical distribution - area, production and productivity in India and Andhra Pradesh - economic importance- classification- soil - climatic requirements- land preparation - seeds and sowing- seed treatment-seedrate spacing-season-time and method of sowing.
2. Varieties/ Bt cotton - growth stages – branching- nutrient management - water management- weed Management- topping- bud and boll shedding
3. Yield attributes –yield- harvesting-defoliants-mechanized harvesting - quality considerations -cropping systems- climate resilient technologies
4. Jute- Origin - geographical distribution - area, production and productivity in India and Andhra Pradesh - economic importance- - soil - climatic requirements- types of jute- - land preparation - seeds and sowing- seed treatment-seed rate-spacing season-time and method of sowing- varieties - nutrient management - water management- weed management-yield attributes - yield- harvesting – processing of jute- quality considerations- cropping systems.
5. Mesta – Origin - geographical distribution - area, production and productivity in India and Andhra Pradesh - economic importance- - soil - climatic requirements types of mesta - land preparation - seeds and sowing- seed treatment-seed rate spacing-season-time and method of sowing- varieties - nutrient management - water management- weed management-yield attributes –yield- harvesting –processing of mesta- quality considerations- cropping systems. Sugar crops- Sugarcane and Sugarbeet
6. Sugarcane – Origin - geographical distribution - area, production and productivity in India and Andhra Pradesh - economic importance - soil - climatic requirements– Influence of rainfall, temperature, light- land preparation –planting time in Coastal and Rayalseema regions of AP.

UNIT – IV: (6 Hours)

1. Planting material – setts – short crop – nursery crop – different methods of planting – growth stages
2. Nutrient Management – crop logging- trash mulching – wrapping and propping water management- weed management- criteria for judging maturity- climate resilient technologies
3. Ratoon cane management – factors affecting quality of sugarcane – arrowing– jaggery making – clarification.
4. Sugar beet – Origin - geographical distribution - area, production and productivity in India - economic importance- soil - climatic requirements - Land preparation seeds and sowing seed treatment-seed rate-spacing-season-time and - nutrient management - water management- weed management- yield attributes –yield harvesting - quality considerations cropping systems
5. Tobacco –Origin - geographical distribution - area, production and productivity in India and Andhra Pradesh - economic importance - soil - climatic requirements– types of tobacco Land preparation.
6. Nursery management-seeds and sowing for different types- seed treatment-seed rate spacing-season-time and method of sowing.

UNIT – V (6 Hours)

1. Varieties - nutrient management – topping and desuckering-water management weed management- yield attributes –yield- harvesting –priming-curing
2. Quality characters-nicotine content, burning quality, aroma and sugar content methods of curing -flue curing of Virginia tobacco - cropping systems
3. Forage crops- Importance- terminology in forage production-classification of fodders sorghum and maize importance-seeds and sowing - nutrient requirement irrigation- weed management- harvesting –yield-quality of fodder.
4. Cowpea, cluster bean - napier grass - importance- seeds and sowing -nutrient requirement irrigation- weed management- harvesting –yield- quality of fodder.
5. Lucerne, berseem, oat – importance- seeds and sowing -nutrient requirement irrigation weed management-harvesting –yield quality of fodder.
6. Forage crops- Quality considerations- preservation of fodder – hay and silage making Other crops: Potato
7. Potato - Origin - geographical distribution - area, production and productivity in India - economic importance- - soil - climatic requirements – varieties – soil - climatic requirements - land preparation - seeds and sowing- seed treatment-seed rate spacing-season-time and - nutrient management - water management- weed management- yield attributes –yield harvesting - quality considerations- cropping systems

REFERENCES TEXT BOOKS:

- Reddy, S.R. and Reddi Ramu. 5th edition, 2016. Agronomy of field crops. Kalyani publishers, Ludhiana.
- Chidda Singh, Singh, P and Singh, R. 2003. Modern techniques of raising field crops. Oxford & IBH Publishing house, New Delhi.
- Rajendra Prasad. 2004. Text book of field crops production. Commercial crops, volume-II, Technical Editor, ICAR, New Delhi.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

IV SEMESTER **AGRICULTURE & RURAL DEVELOPMENT** TIME:30HRS

AGRD 202P (1) **CROP PRODUCTION TECHNOLOGY–II** MARKS:50

PRACTICAL SYLLABUS

OBJECTIVES:

- To learn Land preparation and layout of plots
- To know about Different types of sowing methods
- To identify plant characteristics of oil seeds, fiber, sugar crops and fodder crops

Course Outcomes:

CO1: Explain Importance of oilseed crops- edible and non – edible oils – nutritional value importance in Indian economy.

CO2: Explain Soil and climatic requirements - types - growth stages - land Preparation -seeds and sowing- seed treatment-seed rate-spacing-season-time and method of sowing varieties.

CO3: Classify Nutrient and Nursery management- water management- weed management yield attributes – yield- Harvesting – post harvest operations- quality considerations – cropping systems.

EXPERIMENTS:

1. Land preparation and layout of plots **(4hrs)**
2. Sowing methods of sugarcane **(3hrs)**
3. Sowing of oil seeds, fiber, sugar crops and fodder crops **(3hrs)**
4. Identification of plant characteristics of oil seeds, fiber, sugar crops and fodder crops **(3hrs)**
5. Yield and juice quality analysis of sugarcane **(3hrs)**
6. Visit to research stations of related crops **(3hrs)**
7. Collection of post-harvest data on the crop **(3hrs)**
8. Agronomy Tour Visit to agronomic experiments of Oil seeds, fiber, sugar crops and fodder crops at experimental farms. **(4hrs)**
9. Visit to nearby farmers' fields **(4hrs)**

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
IV SEMESTER **AGRICULTURE & RURAL DEVELOPMENT** TIME:30HRS
AGRD 203 (2) **IRRIGATION, WATER MANAGEMENT & FARMING SYSTEMS** MARKS:100
SYLLABUS

OBJECTIVES

- To determine bulk density
- To know lay out of surface irrigation methods
- To determine soil moisture content by gravimetric and volumetric method

Course Outcome

CO1: Summarize the farming and cropping systems in India.
CO2: List and explain different allied enterprises.
CO3: Explain the techniques of sustainable agriculture and development of integrated farming systems, including models for different agri-climatic zones.
CO4: Discuss the properties and relationship of natural resources and their importance in integrated farming systems and methods of irrigation.

UNIT – 1: (6hrs)

1. Farming System – introduction – scope of farming system – importance – concept – principles of farming system.
2. Types of farming systems – advantages and limitations - suitability – factors affecting the farming system
3. Farming systems – system and systems approach - determinants of farming system – cropping systems (navadhanya concept) and related terminology
4. Allied enterprises – significance of integrating crop and livestock enterprises – components and maintenance- dairying and sheep and goat rearing – breeds – housing– feed and fodder requirements – biogas plant
5. Allied enterprises – poultry farming – breeds – housing –feed and fodder requirements – apiculture – species and management
6. Allied enterprises – sericulture – moriculture and silkworm rearing – agro-forestry systems suitable for dryland farming
7. Tools for determining production and efficiencies in different farming and cropping systems.

UNIT-II (6hrs)

1. Adverse effects of modern agriculture - sustainable agriculture –definition –concept – goals – elements.
2. Problems related to soil, water and environment - adaptation and mitigation strategies - indicators of sustainability.
3. Conservation agriculture – concept – need - management of natural resources land, water and vegetation.
4. Techniques for sustainability - Low External Input Agriculture (LEIA) and Low External Inputs for Sustainable Agriculture (LEISA) and HEIA (High External Input Agriculture).
5. Integrated farming system-historical background, objectives and characteristics advantages
6. Site specific development of IFS models for different agro climatic zones of India and A.P.

UNIT – III: (6hrs)

1. Resource use efficiency – optimization of resource use by different methods in an IFS (Annapurna model)
2. Resource cycling - flow of energy in different farming systems. Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmers field
3. Introduction – importance – definition and objectives - water resources of world.
4. Surface and ground water resources in India and Andhra Pradesh–important major irrigation projects in India and Andhra Pradesh.
5. Soil-water relations – physical properties of soil viz., depth, soil texture, soil structure, particle density, bulk density and porosity influencing water retention, movement and availability.

6. Water retention in soil – adhesion and cohesion – soil moisture tension – pF – soil moisture characteristic curves- Water movement in soils – infiltration – percolation – seepage – permeability – hydraulic conductivity – saturated and unsaturated water flow.

UNIT – IV: (6hrs)

1. Kinds of water in soil – gravitational water – capillary water – hygroscopic water – their importance in crop production - Soil moisture constants – saturation – Field capacity (FC) – Permanent Wilting Point (PWP) – Available Soil Moisture (ASM) – hygroscopic coefficient –theories of soil water availability.
2. Plant-water relationships – rooting characteristics – effective root zone depth – moisture extraction pattern – moisture sensitive periods of crops – Soil Plant Atmospheric Continuum (SPAC).
3. Evapotranspiration – evaporation – transpiration – factors influencing evapotraspiration – Reference crop evapotraspiration (ETo) – Crop coefficient – Crop Evapotranspiration (ETc) - daily, seasonal and peak period consumptive use.
4. Crop water requirement – irrigation requirement – net and gross irrigation requirement – irrigation interval – irrigation period – seasonal water requirement of important crops – duty of water – base period – relation between duty and base period – conjunctive use of water – advantages of conjunctive use.
5. Scheduling of irrigation – different criteria – soil moisture regime approach – feel and appearance method – soil moisture tension and depletion of available soil moisture method - climatological approach – Irrigation Water (IW) / Cumulative Pan Evaporation (CPE) ratio method.
6. Scheduling of irrigation – plant indices approach – visual symptoms – soil cums and mini plot technique – growth rate – relative water content – plant water potential – canopy temperature – indicator plants and critical growth stages.

UNIT – V (6hrs)

1. Methods of irrigation - surface methods – wild flooding check basin, ring basin, border strip, furrow and corrugations – advantages and disadvantages- Sub surface irrigation.
2. Micro irrigation systems - sprinkler irrigation – merits and demerits – system components and layout – suitable crops – rain guns.
3. Drip irrigation (surface and sub surface) – merits and demerits – system components and layout – suitable crops - fertigation and maintenance of micro irrigation systems.
4. Water Use Efficiency (WUE) – crop and field water use efficiency – factors influencing WUE – climatic, genetic and management (agronomic) factors
5. Irrigation efficiencies – water conveyance efficiency, water application efficiency, water storage efficiency, water distribution efficiency and project efficiency.
5. Quality of irrigation water – salinity hazard, sodium hazard, residual sodium carbonate and boron toxicity – criteria and threshold limits – management practices for using poor quality water.
6. Water logging – causes for waterlogging – drainage- surface and sub-surface drainage systems – relative merits.

References text books

- Michael, A.M. 2006. Irrigation – Theory and Practice. Vikas Publishing House Pvt. Ltd., New Delhi. Reddy, S.R. 2016.
- Arun K. Sharma. 2006. A hand book of organic farming - Agrobios (India) Jodhpu
- Jayanthi C, Devasenapathy P and Vinnila, C. 2008. Farming systems principles and practice. Satish serial publishing house, Delhi
- Panda.S.C. 2011. Cropping and farming systems. Agrobios (India) Jodhpur. Ruthenburg, H. 1980. Farming systems in the tropics. Oxford university.

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

IV SEMESTER **AGRICULTURE & RURAL DEVELOPMENT** TIME:30HRS
AGRD203 P (1) **IRRIGATION, WATER MANAGEMENT & FARMING** MARKS:50
PRACTICAL SYLLABUS

OBJECTIVES:

- To Determine the bulk density
- To study about Lay out of surface irrigation methods
- To Determine the soil moisture content by gravimetric and volumetric method

Course Outcomes:

CO1: Explain Farming Systems, scope of farming system, importance and principles of farming system.

CO2: Classify Types of farming systems, advantages and limitations.

CO3: Summarize Allied enterprises on sericulture, moriculture and silkworm rearing and sustainability indicators.

EXPERIMENTS:

1. Determination of bulk density **(3Hrs)**
2. Determination of soil moisture content by gravimetric and volumetric method **(3 hrs)** 3. Determination of infiltration rate **(3 hrs)**
4. Determination of field capacity by field method **(3 hrs)**
5. Measurement of irrigation water through flumes, weirs and V notches **(3 hrs)**
6. Scheduling of irrigation by IW / CPE ratio method **(3 hrs)**
7. Calculation of irrigation water requirements **(3 hrs)**
8. Lay out of surface irrigation methods **(3 hrs)**
9. Visit to micro irrigation systems in farmer fields. **(3 hrs)**
10. Water management practices in rice, wheat and maize. **(3 hrs)**

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

IV SEMESTER **AGRICULTURE & RURAL DEVELOPMENT** TIME:30 HRS

AGRD 220 (2) **RURAL DEVELOPMENT PLANNING & MANAGEMENT** MARKS:100

SYLLABUS

OBJECTIVES:

- To study about unit aimed at enabling you to understand the process of planning
- To study about the process of planning in India;
- To indicate the nature of the planning machinery both at the national and state level.

Course Outcomes:

CO1: Explain types of planning process in rural development.

CO2: Discuss the decentralization of planning.

CO3: Elaborate on different levels of planning.

CO4: Discuss strategies for sustainable development in rural areas.

UNIT – I: (6 Hrs.)

- Types of Planning Process

UNIT II: (6 HRS.)

- Decentralization of Planning

UNIT III: (6 HRS.)

- Micro Level Planning (Village Level Planning)

UNIT IV: (6 HRS.)

- Block and District Level Planning- Strategies for Sustainable Development

UNIT V: (6 HRS.)

- District Planning

REFERENCE BOOKS:

- Cabral L (2006) Poverty Reduction Strategies and the Rural Productive Sectors: What Have we Learnt, What Else do we Need to Ask? Natural Resource Perspectives 100, Overseas Development Institute.
- CGD (2011) Cash on Delivery: a New Approach Financing Foreign Aid. Publisher's Notes, Centre for Global Development, Washington DC.
- Available from: http://www.cgdev.org/content/publications/detail/1423949/ [Accessed 20 May 2013]

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

IV SEMESTER **AGRICULTURE & RURAL DEVELOPMENT** TIME: 30 HRS
AGRD 221 (2) **MANURES, FERTILIZERS & SOIL FERTILITY** MARKS: 100

SYLLABUS

Objectives

- To Estimate available N in soils
- To Estimate of K & S in plant samples
- To Identify acid radicals in fertilizers /salts

Course Outcomes

CO1: Discuss the conceptual framework of soil fertility and plant nutrition.
CO2: Classify plant nutrients and explain nutrient cycles.
CO3: Summarize the deficiency and toxicity symptoms in plants and corrective measures.
CO4: Discuss the methods of soil fertility evaluation and plant analysis and mixed fertilizer Application in Agriculture.

UNIT – 1: (6 Hours)

1. Introduction - History of soil fertility and plant nutrition - Concepts of soil fertility, soil productivity, Navadhanya and Annapurna concepts in relation to soil fertility Soil as a source of plant nutrients - Nutrient Elements - Arnon's criteria of essentiality – Essential, functional and beneficial elements.
2. Scientists responsible for the essentiality of nutrients -Ionic forms of plant nutrients in soil – Mechanism of nutrient transport - Movement of ions from soils to roots – Mass flow, diffusion, root interception and contact exchange.
3. Essential nutrients – Classification and their functions in plants.
4. Deficiency symptoms of nutrients - Corrective measures – Toxicity symptoms of different nutrients.
5. Nitrogen - Occurrence, content and distribution - Factors influencing the content of nitrogen in soil. Forms of soil nitrogen - Nitrogen Cycle – Transformations in soils – Mineralization (aminisation and ammonification) - Fate of released ammonia – Factors affecting ammonium fixation - Nitrification – Factors affecting nitrification – Fate of released nitrate nitrogen.
6. Leaching losses of nitrate nitrogen – Nitrification inhibitors-Denitrification – Immobilization, Nitrogen fixation - Different types – Biological fixation of nitrogen – Symbiotic and non symbiotic – Nitrogen balance sheet – Gains and losses.

UNIT – II: (6 Hours)

1. Phosphorus - P – Cycle – Content in soils – Forms of phosphorus in soil - Inorganic and organic phosphorus compounds – Phosphorus fixation – Mechanisms of phosphate fixation - Factors affecting phosphate fixation in soil - Quantity and intensity parameters.
2. Potassium - Content in soil – Source – Forms of soil potassium - Potassium fixation Factors affecting potassium fixation – Quantity and Intensity parameters – Luxury consumption.

3. Calcium - Sources and content – Forms of calcium in soil, factors affecting the availability of calcium in soil –Magnesium - Sources – Content – Forms of magnesium in soils - Factors affecting availability of magnesium - Functions.
4. Sulphur - S – Cycle – Occurrence – Forms of Sulphur in soil - Sulphur transformation in soils – Mineralization and immobilization - Sulphur Oxidation – Factors affecting oxidation in soils - Sulphide injury – Causes, symptoms and remedial measures.
5. Micronutrient - Sources – Forms in soil solution – Pools of micronutrients – Predisposing factors for occurrence of micronutrient deficiencies in soil and plants
6. Zn and Mn - Content – Forms in soils – Critical limits in soils and plants - Factors affecting their availability.
7. Fe and Cu - Content – Forms in soils – Critical limits in soils and plants. Factors affecting their availability.

UNIT - III (6 Hours) :

1. Boron and Molybdenum - Content – Forms in soil - Critical limits in soils and plants. Factors affecting their availability.
2. Chlorine - Content – Forms in soils – Critical limits in soils and plants. Factors affecting its availability – Beneficial Elements- Sodium, Cobalt, Vanadium and Silicon
3. Soil fertility Evaluation: - Approaches – Soil testing – Objectives of soil testing – Chemical methods for estimating available nutrients. 4.Plant analysis – Rapid tissue tests – Indicator plants - Biological methods of soil fertility evaluation, A- value – Microbiological methods – Sackett and Stewart techniques – Mehlich technique – Cunninghamella plaque method – Mulder's Aspergillus niger technique – Mistcherlich's pot culture method.
5. Soil test-based fertilizers recommendation: - Critical nutrient concept (Cate and Nelson) – Critical levels of nutrients in soils - General recommendations Use of empirical equations for scheduling fertilizer doses - Targeted yield approach
6. Nutrient use efficiency: - Soil, plant and management factors influencing Nutrient use efficiency in respect of N, P, K, S, Fe and Zn fertilizers – Foliar application – Fertigation – Liquid fertilizers.
7. Methods of application of nutrients under rainfed and irrigated conditions

UNIT – IV (6 Hours):

1. Introduction and importance of organic manures - Definition and difference between manures and fertilizers-Classification of manures (Bulky & Concentrated) with suitable examples. Importance of manures in soil fertility management.
2. Bulky organic manures – Preparation of FYM – Methods of collection and storage. Losses of nutrients from FYM during collection and storage -Ways to minimize these losses.
3. Compost and composting – Different methods of composting including the starters and raw materials

4. Methods of preparation of rural and urban compost. Mechanical compost plants – Their advantages over conventional composting –Vermi-composting
5. Green manures – Classification with examples. Advantages and limitations of green manuring and green leaf manuring. Biogas plant – Principles of operation and its advantages.
6. Definitions of penning, sewage, sewerage, sullage, pouderette, Activated compost process. Concentrated organic manures – Oil cakes, blood meal, bone meal, horn meal, fish meal, meat meal and guano.

UNIT – V: (6 Hours)

1. Chemical fertilizers – Classification with examples – Nitrogenous fertilizers – composition and properties of major nitrogenous fertilizers viz., Ammonium sulphate, urea and calcium ammonium nitrate.
2. Phosphatic fertilizers – Composition of Rock phosphate – Occurrence, types and properties- properties of SSP, TSP and basic slag – Potassic fertilizers –MOP, SOP properties.
3. Secondary and micronutrient fertilizers – Different sources of these nutrients and their contents - Conditions leading to their deficiency - Methods of application and mode of action of NPK fertilizers in soils.
4. Amendments – Role of important organic and inorganic amendments and synthetic conditioners as amendments - Complex fertilizers – Types, composition of DAP, MAP, UAP, important nitrophosphates.
5. Mixed fertilizers – Advantages and disadvantages over straight fertilizers - Nanofertilizers Fertilizer grade – Fertilizer ratio – unit value of fertilizers – Problems - INM - Components - Advantages.
6. Fertilizer Control Order (FCO) – Its importance and regulations - Specifications for important fertilizers - Fertilizer storage – Specifications - Problems during storage.

References text book

1. Indian Society of Soil Science.2012. Fundamentals of Soil Science. IARI, New Delhi.

2. Yawalkar K.S, Agarwal, T.P and Bokde, S 1995. Manures and Fertilisers. Agril. Publishing House, Nagpur

3. Samuel Tisdale, Nelson Werner L, Beaton James D and Havlin John L. 2005. Soil Fertility and Fertilizers: An Introduction to Nutrient Management, Macmillian Publishing Co., New York. 4. D. K .Das 2014. Introductory Soil Science. Kalyani Publishers, New Delhi

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

IV SEMESTER **AGRICULTURE & RURAL DEVELOPMENT** TIME: 30 HRS
AGRD 221P (1) **MANURES, FERTILIZERS & SOIL FERTILITY** MARKS: 100
PRACTICAL SYLLABUS

OBJECTIVES:

- To Estimate of available N in soils
- To Estimate of K & S in plant samples
- To Identify acid radicals in fertilizers /salts

Course Outcomes:

CO1: Explain History of soil fertility and plant nutrition Concepts of soil fertility, soil productivity.

CO2: Explain Essential nutrients, Classification and their functions in plants

CO3: Outline Deficiency symptoms of nutrients, Corrective measures, Toxicity symptoms of different nutrients

EXPERIMENTS:

1. Introduction to analytical instruments and principles-spectrometry and flame photometry **(3hrs)**
2. Estimation of available N in soils **(3hrs)**
3. Estimation of K & S in plant samples **(3hrs)**
4. Identification acid radicals in fertilizers /salts **(3hrs)**
5. Identification of basic radicals in fertilizer /salt **(3hrs)**
6. Estimation of N in Ammonium sulphate **(3hrs)**
7. Estimation of N in Urea and FYM **(3hrs)**
8. Estimation of water soluble P2O5 in SSP **(3hrs)**
9. Estimation of K in Muriate of potash or Sulphate of potash by using Flam

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
IV SEMESTER **AGRICULTURE & RURAL DEVELOPMENT** TIME: 30 HRS
AGRD 242(2) AGRICULTURAL MARKETING, TRADE & PRICES MARKS: 100
SYLLABUS

OBJECTIVES:
- To calculate the elasticities for important agricultural commodities.
- To Study of relationship between market arrivals and prices of some selected commodities.
- To Computate marketable and marketed surplus of important commodities.

Course Outcomes

CO1: Explain different aspects of agricultural marketing.
CO2: Discuss facilitating functions, market functionaries, supply chain management, market promotion.
CO3: Outline the factors affecting demand and supply of agricultural farm products.
CO4: Explain marketing concepts like segmentation, integration, cost, regulated markets and government interventions.

UNIT – 1 **(6hrs)**

1. Agricultural Marketing - Concepts and definitions of market, marketing, agricultural marketing - Components of market, dynamics of market structure.
2. Classification and characteristics of each type of agricultural markets.
3. Demand and supply of Agri-commodities, factors affecting the demand and supply of farm products, producer's surplus - Meaning and types and producer's surplus of Agri commodities in India.
4. Meaning of marketable surplus and marketed surplus, importance and their measurement. marketable surplus and marketed surplus of Agri-commodities in India, factors affecting them.
5. Marketing process and functions - Marketing process - Concentration, dispersion and equalization - Thompson's classification.
6. Exchange functions – Buying and selling, methods - Physical functions – Storage, transportation and processing.

UNIT – 2 **(6hrs)**

1. Facilitating functions – Packing and packaging, branding, grading, standardization, FAQs for major crop produce, quality control and labeling - AGMARK, HACCP, FSSAI, CODEX - Need for codex certification and relevance.
2. Market functionaries - Types and importance of agencies involved in agricultural marketing and their role - Producers, middlemen (merchant middlemen, agent middlemen, speculative middlemen, processors, facilitative middlemen).
3. Meaning and definition of marketing channels and supply chain management and their importance.
4. Marketing mix - Meaning, 4Ps of marketing - Product, price, place and promotion Their importance and characteristics in agriculture.
5. Meaning and stages in PLC (Product Life Cycle) - Characteristics of PLC - Strategies in different stages of PLC.
6. Pricing and promotion strategies - Pricing considerations and approaches – Cost based and competition-based pricing.
7. Market promotion – Advertising, personal selling, sales promotion and publicity – Their meaning and merits and demerits.

UNIT – 3: (6hrs)

1. Market Segmentation-Meaning and its importance, types of market segmentation and benefits.
2. Market Integration - Meaning, definition - Marketing efficiency - Meaning, definition, measurement of marketing efficiency - Types of market integration and marketing efficiency.
3. Marketing costs, margins and price spread - Meaning and measurement, factors affecting cost of marketing - Reasons for higher marketing costs of farm commodities - Ways of reducing marketing costs.
4. Regulated Markets-Definition - Important features of regulated markets - Functions, progress and defects.
5. Model regulated market act, objectives and features - APMC Act in Andhra Pradesh - Objectives and features and functions
6. Govt. interventions in agricultural marketing, their need, importance, and role Important market acts - Public sector institutions - CWC, SWC, FCI, & DMI – Objectives and functions.

UNIT – 4: (6hrs)

1. Cooperative marketing - Meaning and its need and importance, cooperative marketing agencies in India - NAFED, MARKFED – Objectives and functions and activities.
2. Risk in marketing - Types of risk in marketing - Measures to minimize risks, speculation and hedging - Meaning, differences between speculation & hedging, advantages, disadvantages and process of speculation and hedging.
3. An overview of futures trading in agricultural commodities - Forward/future markets - Meaning, advantages and disadvantages of forward markets.
4. Commodity exchanges – Role and importance - Commodity exchanges in India MCX, NCDX, NCMX, ACX, Safal - Role of regulatory bodies in futures markets - SEBI, etc, Contract farming - Meaning, procedures and advantages - Contract farming act in Andhra Pradesh.
5. Meaning and functions of price - Characteristics of agricultural product prices Agricultural price stabilization - Need for agricultural price policy - Role of Commission for Agricultural Costs and Prices (CACP) - Meaning of administered prices - Minimum support price, procurement price and issue price, levy price.
6. Concept of International Trade and its importance in globalised world economies Free trade and protectionism - Meaning, pros and cons of free trade and protectionism.

UNIT – 5: (6hrs)

1. Theory of absolute and comparative advantage and their importance international trade.
2. Trends, present status and prospects of Indian agri-commodities trade in international trade.
3. WTO - Genesis, objectives, functions and principles of multilateral trade.
4. WTO agreements - Agreement on Agriculture (AoA) - Market access, Aggregate Measures of Support (AMS), export subsidies, sanitary and phyto santitary measures (SPS) and their implications and impact on Indian agriculture.
5. TRIPS and intellectual property rights and their implications to Indian agriculture Meaning of patents, copy rights, trademarks, geographical indications, industrial designs, trade secrets, integrated circuits, and plant varieties protection.

REFERENCE TEXT BOOKS

- S S Acharya and N L Agarwal. 2012. Agricultural Marketing in India. Oxford & IBH Publications Co. Pvt. Ltd., New Delhi.
- S S Acharya and N L Agarwal. Agricultural Price: Analysis and Policy. Oxford & IBH Publications Co. Pvt Ltd., New Delhi.
- Subba Reddy, S., P.Raghu Ram., Sastry, T.V.N and Bhavani Devi, I. 2016. Agricultural Economics. Oxford & IBH Publishing Company Private Ltd., New Delhi,
- Kahlon, A.S and Tyagi.D S. 1983. Agricultural Price Policy in India. Allied Publishers Pvt. Ltd., New Delhi.
- Mamoria, C.B. and Joshi. R L.1995. Principles and Practices of Marketing in India. Kitab Mahal, Allahabad
- Philip Kotler, Kevin Lane Keller, Abraham Koshy and Mithileswar Jha. 2009. Marketing Management: A South Asian Perspective. International 13th edition. Pearson Prentice Hall

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
IV SEMESTER **AGRICULTURE & RURAL DEVELOPMENT** TIME:15 HRS
AGRD 252 (1) **RENEWABLE ENERGY & GREEN TECHNOLOGY** MARKS:100
SYLLABUS

OBJECTIVES:

- To know Availability and uses of non - conventional energy in the agricultural sector.
- To know Bio-fuel production from biomass and its application.
- To study about Practical approach to biogas production and biogas plants capacity and design calculations.

Course Outcomes:

CO1: Explain the classification, advantages and disadvantages of renewable energy sources.
CO2: Classify gasifiers and briquettes and explain the uses.
CO3: Outline the methods of tapping solar energy and its applications.
CO4: Summarize the types, construction and applications of wind mills and biomass

UNIT – I: (3 Hours)

1. Introduction - Renewable energy sources, classification, advantages and disadvantages. 2. Biomass - Importance of biomass, classification of energy production - Principles of combustion, pyrolysis and gasification.
2. Biogas - Principles of biogas production, advantages, disadvantages, utilization.
3. Biogas plants - Classification, types of biogas plants, constructional details of biogas plants.

UNIT – II: (3 Hours)

1. Types of gasifiers - Producer gas and its utilization.
2. Briquettes, briquetting machinery – Types and uses of briquettes - Shredders.
3. Solar energy – Application of solar energy, methods of heat transfer, conduction, convection and radiation.

UNIT – III: (3 hours)

1. Solar appliances - Flat plate collectors, focusing type collectors, solar air heater.
2. Solar space heating and cooling - Solar energy gadgets, solar cookers, solar water heating systems.
3. Solar grain dryers, solar refrigeration system, solar ponds.

UNIT – IV: (3 Hours)

1. Solar photovoltaic system - Solar lantern, solar street lights, solar fencing, solar water pumping system.
2. Wind energy - Advantages, disadvantages, wind mills and types.
3. Constructional details of wind mills, applications of wind mills.

UNIT – V: (3 hours)

1. Biofuels – Characteristics of various biofuels, different parameters and calorific values.
2. Bio diesel production – Applications, extraction from jatropha.
3. Ethanol from agricultural produce (sugarcane and corn).

REFERENCES TEXT BOOKS :

- Rai, G.D. 2004. Non-conventional Energy Sources. Khanna Publishers, New Delhi. Rajput, R. K. 2012. Non-conventional Energy Sources. S. Chand Publishers.
- Ojha, T.P. and Michael, A.M. Principles of Agricultural Engineering. Vol. I, Jain Brothers, New Delhi.
- Rathore, N.S., Mathur, A.N. and Kothari, S. Alternate Sources of Energy. ICAR Publication.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
IV SEMESTER **AGRICULTURE & RURAL DEVELOPMENT** TIME:30 HRS
AGRD 252P (1) **RENEWABLE ENERGY & GREEN TECHNOLOGY** MARKS:50
PRACTICAL SYLLABUS

OBJECTIVES:

- To know Availability and uses of non – conventional energy in the agricultural sector.
- To study about Bio-fuel production from biomass and its application.
- To study about practical approach to biogas production and biogas plants capacity and design calculations.

Course Outcomes:

CO1: Understand of biomass, classification of energy production – Principles of combustion, pyrolysis and gasification.

CO2: Explain classification, types of biogas plants.

CO3: Understand types of gasifiers and Solar energy.

EXPERIMENTS:

1. Availability and uses of non – conventional energy in the agricultural sector. **(3hrs)**
2. Bio-fuel production from biomass and its application. **(3hrs)**
3. Practical approach to biogas production and biogas plants capacity and design calculations. **(3hrs)**
4. Evaluation of solar pump for agriculture. **(3hrs)**
5. Study of solar drying system. **(3hrs)**
6. Study of solar distillation and solar pond. **(3hrs)**
7. Steps adopted for erecting solar fence. **(3hrs)**
8. Visit to a solar wind farm. **(3hrs)**
9. Visit to a solar photovoltaic farm. **(4hrs)**

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
IV SEMESTER **MULTIDISCIPLINARY COURSE** TIME: 2HRS/WEEK
EDB 4001(2) **ENTREPRENEURSHIP DEVELOPMENT & BUSINESS** MARKS: 50
SYLLABUS

Course Outcome

CO1: Explain concepts of entrepreneur, entrepreneurship and its development in the Indian agricultural sector.

CO2: Outline the use of SWOT analysis to assess agri-enterprises and various skills required for successful entrepreneurship.

CO3: Summarize governmental and non-governmental agencies in entrepreneurship development in the Indian agriculture sector.

CO4: Classify the types of agri-enterprises and supply chain and marketing management.

UNIT –I (2 Hours)

1. Concept of entrepreneur, entrepreneurship - Distinction between an entrepreneur and a manager - Management - Management functions – Planning - Organizing - Directing - Motivation - Ordering - Leading – Supervision Communication and Control.
2. Characteristics of entrepreneurs - Opportunities for entrepreneurship and rural entrepreneurship - Types of entrepreneurs and functions of entrepreneurship.
3. Agri – entrepreneurship - Concept, need and scope - Assessing overall business environment in Indian economy and globalization and the emerging business entrepreneurial environment.
4. Entrepreneurship development programmes (EDPs) – Objectives, phases, problems of EDPs - Entrepreneurial behavior and role of achievement - Motivation, factors affecting entrepreneurship development.

UNIT –II (2 Hours)

1. Generation, incubation and commercialization of business ideas - Environment scanning and opportunity identification - Researching/ Managing competition Ways to define possible Competitors.
2. Globalization and the emerging business entrepreneurial environment - Role of ED in economic development of a country - Overview of Indian social, political systems and their implications for decision making by individual entrepreneurs.
3. SWOT Analysis - Concept, meaning and advantages.

UNIT –III (2 Hours)

1. Government policies, incentives, programmes and schemes for entrepreneurship development - Export and import policies relevant to Indian Agriculture sector.
2. Institutional support - Financial Institutions and other agencies in entrepreneurship development
3. Venture capital (VC), contract farming (CF) and joint ventures (JV) - Public-private partnerships (PPP).

UNIT – IV (2 hours)

1. Overview of agricultural input industry – Seed, fertilizer, pesticides, farm machinery and agricultural food processing industry.
2. Steps in establishment of MSME Enterprise - Planning of an enterprise - Project identification - Selection of the product/ services - Selection of form of ownership - Registration, selection of site, capital sources, acquisition of manufacturing know how, packaging and distribution.

3. Project planning - Formulation and project report - Meaning - Importance Components and preparation.

UNIT – V (2 Hours)

1. Supply chain management - Meaning, advantages, stages and process and total quality management.
2. Marketing management - Market types - Marketing assistance - Market strategies - Definition of business - Stakeholders in business - Stages of Indian business Importance of agribusiness in Indian economy - Social responsibility of business - Morals and ethics in enterprise management.
3. Assessment of entrepreneurship skills - Business leadership skills Communication skills for entrepreneurship development - Developing organizational skill - Developing managerial skills - Problem solving skill and time management skills.

Reference Books

- Anil Kumar, S., Poornima, S. C., Mini, K., Abraham andJayashree, K. 2003. Entrepreneurship Development. New Age International Publishers, New Delhi 2 Bhaskaran, S. 2014. Entrepreneurship Development & Management. Aman Publishing House, Meerut
- Gupta, C.B. 2001. Management: Theory and Practice. Sultan Chand and Sons, New Delhi 4 Indu Grover 2008. Handbook on Empowerment and Entrepreneurship. Agrotech Publishing Academy, Udaipur
- Khanka, S.S. 1999. Entrepreneurship Development. S. Chand and Co., New Delhi

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
IV SEMESTER **AGRICULTURE & RURAL DEVELOPMENT** TIME:15 HRS
HORD 282(2) **PRODUCTION TECHNOLOGY OF FRUITS & PLANTATION CROPS**
SYLLABUS MARKS:100

Objectives

- To Identify Fruits and plantation crops
- To prepare and planting and propagation of fruits and plantation crops
- To know the production technology of fruits and plantation crops
- To know the processing of plantation crops

Course Outcomes

CO1: Students will be able to understand the importance and research institutes in our country,explain the importance of fruits and plantation crops
CO2: Students will understand about Production technology of fruits and plantation crops
CO3: Students will understand pest and diseases and their management of fruits and plantation crops
CO4: Uses and propagation of plantation crops

Theory

UNIT – I

1. Importance and scope of fruit and plantation crop industry in India
2. High density planting
3. Use of rootstocks

UNIT – II

1. Production technologies for the cultivation of major fruits-mango, banana, citrus,
2. Production technologies for the cultivation of grape, guava.

UNIT – III

1. Production technologies for the cultivation of litchi, papaya, apple.
2. Production technologies for the cultivation of minor fruits- pineapple, pomegranate, jackfruit, strawberry.

UNIT – IV

1. Production technologies for the cultivation of nut crops; plantation crops-coconut, arecanut.
2. Production technologies for the cultivation of cashew, tea, coffee.

References text books

- Bose, T.K. and Mitra, S.K. 1990. Fruits-Tropical and Sub-tropical. Naya Prakashan, Calcutta.
- Chattopadhya, P.K. 2012. Text Book on Pomology (Fundamentals of Fruit Growing). Kalyani Publishers, Ludhiana.
- Bijendra Singh. 2012. Horticulture at a Glance. Kalyani Publishers, Ludhiana.
- Parthasarathy,V.A., P.K. Chattopadhyay and Bose, T.K. 2006. Plantation Crops.Vol I and II. Parthasankar basu Naya Udyog, Kolkata.
- Kumar, N., Abdul Khader,J.B.M.,Rangaswamy, P. and Irulappan,I. 2004. Introduction to Spices, Plantation crops, Medicinal and Aromatic Crops. Oxford and IBH Publishing Co.,New Delhi.

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
IV SEMESTER **AGRICULTURE & RURAL DEVELOPMENT** TIME:15 HRS
HORD 282 P(1) **PRODUCTION TECHNOLOGY OF FRUITS & PLANTATION CROPS**

SYLLABUS

Objectives

- To Identify Fruits and plantation crops
- To prepare and planting and propagation of fruits and plantation crops
- To know the production technology of fruits and plantation crops
- To know the processing of plantation crops

Course Outcomes

CO1: Students will be able to understand the importance and research institutes in our country,explain the importance of fruits and plantation crops
CO2: Students will understand about Production technology of fruits and plantation crops
CO3: Students will understand pest and diseases and their management of fruits and plantation crops
CO4: Uses and propagation of plantation crops

PRACTICALS

1. Identification of Fruits Crops
2. Layout of Orchard
3. Planting of an Orchard
4. Training and Pruning Methods in Fruit Crops
5. Identification of Fruits Nutritional and Physiological Disorders
6. Identification of Plantation Crops.
7. Processing of Coffee & Tea.
8. Processing of Fermented Products like Nira,Fenny etc.,

References

- Bose, T.K. and Mitra, S.K. 1990. Fruits-Tropical and Sub-tropical. Naya Prakashan, Calcutta.
- Chattopadhya, P.K. 2012. Text Book on Pomology (Fundamentals of Fruit Growing). Kalyani Publishers, Ludhiana.
- Bijendra Singh. 2012. Horticulture at a Glance. Kalyani Publishers, Ludhiana.
- Parthasarathy,V.A., P.K. Chattopadhyay and Bose, T.K. 2006. Plantation Crops.Vol I and II. Parthasankar basu Naya Udyog, Kolkata.
- Kumar, N., Abdul Khader,J.B.M.,Rangaswamy, P. and Irulappan,I. 2004. Introduction to Spices, Plantation crops, Medicinal and Aromatic Crops. Oxford and IBH Publishing Co.,New Delhi.

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

IV SEMESTER **AGRICULTURE & RURAL DEVELOPMENT** TIME:15 HRS

HORD 284 (1) **PRODUCTION TECHNOLOGY FOR SPICE CROPS** MARKS:100

SYLLABUS

OBJECTIVES:

- To study about production technology of spices
- To know importance of spices crops
- To understand the scientific cultivation methods of spices
- To study classification of spices.

Course Outcomes

CO1: Classify and explain the importance of spices in human nutrition and national economy.
CO2: Outline the agronomical practices for spices.
CO3: Summarize physiological disorders of spices
CO4: Explain disease and pest control and in spices and seed production techniques.

THEORY

UNIT – I:

1.Black pepper - Botanical name – Family - Origin - Introduction - Varieties - Climate- Soil – Systems of cultivation -propagation - Planting - Shade regulation - Training and pruning - Fertilizer requirements - Irrigation - Intercultural operations - Harvesting – Processing – Yield Pests and diseases.

2. Cardamom - Botanical name – Family - Origin - Introduction - Varieties - Climatesoil – Systems of cultivation - Propagation - Planting - Shade regulation – Fertilizer requirement - Irrigation - Intercultural operations - Harvesting – Processing - Yield - Pests and diseases.

UNIT – II:

1.Ginger and Turmeric – Botanical name – Family - Origin - Introduction - Varieties - Climate- Soil – Systems of cultivation - Propagation - Planting - Mulching – Fertilizer requirement - Irrigation - Intercropping - intercultural operations - Harvesting – Processing - yield - Pests and diseases – Preservation of seed rhizomes.

2. Cinnamon -Botanical name – Family - Origin - Area - Production-Improved varieties and cultivation practices such as time of sowing sowing - Transplanting techniques - Fertilizer requirements - Irrigation - Intercultural operations - Harvesting - Pests and Diseases

UNIT – III:

1. Coriander and Fenugreek- Botanical name – Family - Origin - Area - Production
2. Improved varieties and cultivation practices such as time of sowing sowing - Transplanting techniques - Fertilizer requirements - Irrigation - Intercultural operations - Harvesting - Pests andDiseases

UNIT – IV:

1. Clove -Botanical name – Family - Origin - Area - Production-Improved varieties and cultivation practices such as time of sowing sowing - Transplanting techniques - Fertilizer requirements - Irrigation - Intercultural operations - Harvesting - Pests and Diseases
2. Cumin--Botanical name – Family - Origin - Area - Production-Improved varieties and cultivation practices such as time of sowing sowing - Transplanting techniques - Fertilizer requirements - Irrigation - Intercultural operations - Harvesting - Pests and Diseases.

References text books

- Prem Singh Arya and S. Prakash 2002. Vegetables Growing in India. Kalyani publishers, New Delhi 5. Bose, T. K, Kabir, J., Maity T. K., Parthasarathy V. A., and
- Som M. G., 2002. Vegetable Crops Vol. II & III Naya Prokash, Kolkata.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

IV SEMESTER **AGRICULTURE & RURAL DEVELOPMENT** TIME:30 HRS

HORD 284P (1) **PRODUCTION TECHNOLOGY FOR SPICE CROPS** MARKS:50

PRACTICAL SYLLABUS

OBJECTIVES:

- To study about production technology of spices
- To know importance of spices crops
- To understand the scientific cultivation methods of spices
- To study classification of spices.

Course Outcomes

CO1: Classify and explain the importance of spices in human nutrition and national economy.

CO2: Outline the agronomical practices for spices.

CO3: Summarize physiological disorders of spices

CO4: Explain disease and pest control and in spices and seed production techniques.

EXPERIMENTS

1. Identify and study the classification of spices
2. Curing of seeds and condiments
3. Processing of spice crops(Turmeric)
4. Grading of spices
5. Extraction of essential oils from spices.
6. Visit to near by spice research station.
7. Germplasm of Seed spices.

References text books:

- Prem Singh Arya and S. Prakash 2002. Vegetables Growing in India. Kalyani publishers, New Delhi 5. Bose, T. K, Kabir, J., Maity T. K., Parthasarathy V. A., and
- Som M. G., 2002. Vegetable Crops Vol. II & III Naya Prokash, Kolkata.
- Shanmugavelu, K.G., N. Kumar and K.V. Peter 2005. Production Technology of Spices and Plantation Crops. Agrobios (India), Jodhpur

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

IV SEMESTER **SKILL DEVELOPMENT COURSE** TIME: 2HRS/WEEK

WM 4001(2) **WEED MANAGEMENT** MARKS: 50

SYLLABUS

Objectives:

- To identify the characteristics of weeds
- To explain about techniques of weed preservation.
- To identify the use of herbicides

Course Outcomes

At the end of the course, students will be able to

CO1: Discuss about the Classification, reproduction and dissemination of weeds.

CO2: Discuss about Allelopathy and its application in weed management.

CO3: Discuss about Herbicide resistance and its management.

CO4: Discuss about Bio-herbicides and their application in agriculture.

UNIT-I: (6Hrs.)

1. Weed -Definition- Dimensions of the problem- Harmful and beneficial effects of weeds on different ecosystems
2. Classification of weeds based on morphology- Life cycle- Habitat-Origin- association- soil reaction and special features with examples

UNIT-II: (6Hrs.)

1. Methods of weed management–Prevention-Control-Eradication-Physical/ mechanical- Cultural methods.
2. Classification of herbicides based on time and method of application

UNIT-III: (6Hrs.)

1. Herbicide formulation-Need for formulation-Types -Relative merits and demerits of each type of formulation
2. Mode of action of herbicides-Important biochemical modes of action of herbicides interfering with photosynthetic reactions, normal respiration-Growth and development

UNIT-IV: (6Hrs.)

1. Herbicide selectivity-Fundamental principles of selectivity- Differential rate of absorption - Differential rate of translocation
2. Herbicide mixtures- Need- Types- Advantages and limitations of herbicide mixtures in agriculture

UNIT-V (6Hrs)

1. IWM-Definition-Objectives-Advantages. Recent advances in non-chemical weed management-Stale seed bed-Soil solarization-Mulches- Brown manuring-Plant origin herbicides
2. Selection of herbicides–Criteria for selection of herbicide based on crop/cropping system-Weed flora-Soil type-Formulation and its cost etc

References Text Books:

1. Gupta, O.P. 2012. Modern Weed Management (4th edition), Agrobios (India) Ltd, Jodhpur

2. Rao,V.S. 1992. Principles of Weed Science (2nd edition),Oxford& IBH Publishing Co.Pvt Ltd, New Delhi.

3. Ross, M.A and Lembi, C.A. 1999. Applied Weed Science. (2nd edition), Prentice Hall of India Pvt Ltd, New Delhi

4. Saraswat, V.N., Bhan, V.M. and Yaduraju, N.T. (eds.).1998. Weed management – ICAR Publication.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

V SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time:30hrs/week

AGRD 301 (2) **GEO INFORMATICS & NANOTECHNOLOGY** Marks:100

SYLLABUS

Objectives

O1: To learn about GIS software, spatial data creation and editing.
O2: To Study About Image processing software.
O3: To Understand Visual and digital interpretation of remote sensing images.

Course Outcomes

At the end of the course, students will be able to

CO1: Explain Precision agriculture: concepts and techniques-Issues and concerns for Indian agriculture.

CO2: Identify the Geo-informatics- definition, concepts, tools and techniques and their use in Precision Agriculture.

CO3: Classify Crop discrimination and Yield monitoring techniques.

CO4: Summarize Spatial data and their management in GIS & AGRO Application of nanotechnology in agriculture - tillage, seed, water, fertilizers, plant protection for scaling-up farm productivity.

CO5: Apply Nano technology procedures in Agriculture.

UNIT- I: **(5 Hrs.)**

Introduction to Precision Agriculture

1. AGRO Precision agriculture: concepts and techniques.
2. Precision agriculture Issues and concerns for Indian agriculture.
3. AGRO Principles and practices of precision agriculture.
4. AGRO Geo-informatics- definition, concepts, tools and techniques and their use in Precision Agriculture.
5. AGRO Crop discrimination and Yield monitoring techniques.

UNIT- II: **(5 Hrs.)**

GPS and its Management

1. Global positioning system (GPS) Introduction
2. Working Principles and objectives of GPS.
3. GPS Components and its application in agriculture.
4. Geodesy and its basic principles.
5. Spatial data and their management in GIS.

UNIT - III: **(5 Hrs.)**

Application of Cartography and remote sensing

1. AGRO Application of nanotechnology in agriculture - tillage, seed, water, fertilizers, plant protection for scaling-up farm productivity.
2. Introduction to Cartography and units of cartography.
3. Cartography map scale, various symbols used in cartography, Soil mapping techniques.
4. Remote sensing and its concepts
5. Remote sensing Spectral reflectance of various earth features, atmospheric windows.

UNIT – IV: **(5 Hrs.)**

1. Remote sensing Technology Methods in agriculture
2. SSAC Image processing and interpretation - geo referencing - supervised and unsupervised classification of RS images.
3. STCR approach for precision agriculture - principles and computations.
4. SSAC Applications of remote sensing techniques in the field of agriculture and allied sciences including drones.
5. Geo Spatial variability of soil fertility.
6. Geo spatial determination, fertilize recommendation using geospatial technologies in precision farming.

UNIT – V: **(5 Hrs.)**

1. Nanotechnology procedures in Farming
2. Nanotechnology, definition, concepts and techniques.
3. Nanoscale –definition – Nano-particles, materials - occurrence – properties.
4. Characterization of nano-materials
5. Structural characterization - Nano-sensors.
6. Nano-fertilizers, nano-pesticides - importance and advantages –synthesis– strategies.

Prescribed Textbooks:

- Pradeep. T. 2007. NANO: The Essentials: Understanding Nanoscience and Nanotechnology. Tata McGraw-Hill Publishing Company Limited, New Delhi
- Lillesand, T.M. and Kiefer, R. W. 1994. Remote sensing and image interpretation. (3rd edition), John Wiley and Sons.
- Anji Reddy, M. 2006. Text book of Remote sensing and Geographical Information Systems, (3rd edition), B.S. Publications, Hyderabad.

Co-curricular Activities: **(5Hrs.)**

PPT Presentation, weekend tests, Field Activities.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

V SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time:30hrs/week

AGRD 301P (2) **GEO INFORMATICS & NANOTECHNOLOGY** Marks:50

PRACTICAL SYLLABUS

Objectives:

O1: To learn about GIS software, spatial data creation and editing

O2: To Study about Image processing software

O3: To Understand Visual and digital interpretation of remote sensing images

Course Outcomes:

At the end of the course, students will be able to

CO1: Analyse GIS software, spatial data creation and editing and processing software.

CO2: Summarise the Supervised and unsupervised classification and acreage estimation.

CO3: Demonstrate soil fertility based on GIS & Outline productivity in management zones.

EXPERIMENTS:

1. SSAC GIS software, spatial data creation and editing. **(5hrs)**
2. SSAC Image processing software. **(5hrs)**
3. SSAC Visual and digital interpretation of remote sensing images. **(5hrs)**
4. SSAC Generation of spectral profiles of different objects. **(5hrs)**
5. SSAC Creation of thematic layers of soil fertility based on GIS. **(5hrs)**
6. AGRO Creation of productivity and management zones. **(5hrs)**

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

V SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time:30hrs/week

AGRD 311 (2) **CROP IMPROVEMENT - I** Marks:100

SYLLABUS

Objectives

- To study about the breeding objectives and breeding procedures of various crops
- To study about the seed production technology of various crops
- To understand floral biology of crops for effective hybridization
-

Course Outcomes

At the end of the course, students will be able to

CO1: Understand breeding objectives for breeding self and cross pollinated crops.

CO2: Explain breeding procedures and seed production in cereal crops.

CO3: Elucidate breeding procedures and seed production in pulses.

CO4: Describe breeding procedures and seed production in oilseed crops.

CO5: Demonstrate breeding procedures and seed production in plantation crops.

UNIT – I: Breeding objectives & methods in cereals (5 Hrs.)

1. Introduction – General Breeding Objectives – Concepts of breeding self-pollinated, cross pollinated and vegetatively propagated crops - Breeding populations relevance in crop improvement.
2. Cereals - Rice - Origin – Distribution of species – Wild relatives and forms –Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids-Accomplishments.
3. Cereals - Wheat and Barley - Origin – Distribution of species – Wild relatives and forms – Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids – Accomplishments.
4. Millets - Sorghum and Pearl Millet - Origin – Distribution of species – Wild relatives and forms – Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids – Accomplishments.

UNIT- II: Breeding objectives and methods of Pulses: (5 Hrs.)

1. Millets - Finger millet, Kodo millet and Proso millet - Origin – Distribution of species – Wild relatives and forms –Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids-Accomplishments.
2. Pulses - Chickpea - Origin – Distribution of species – Wild relatives and forms – Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for

development of hybrids / varieties - Seed production technology of varieties and hybrids- Accomplishments.

3. Pulses - Pigeonpea - Origin – Distribution of species – Wild relatives and forms – Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids – Accomplishments.

UNIT- III: Breeding objectives and methods of Pulses- II (5 Hrs.)

1. Pulses - Urd bean and Mung bean - Origin – Distribution of species – Wild relatives and forms – Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids - Accomplishments.
2. Pulses - Soybean and Cowpea - Origin – Distribution of species – Wild relatives and forms – Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids - Accomplishments.
3. Pulses - Field pea and Lentil - Origin – Distribution of species – Wild relatives and forms –Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties-seed production technology of varieties and hybrids – Accomplishments.

UNIT- IV: Breeding objectives and methods of Oilseeds (5 Hrs.)

1. Oilseeds - Groundnut- Origin – Distribution of species – Wild relatives and forms – breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids- Accomplishments.
2. Oilseeds - Castor and Sesame - Origin – Distribution of species – Wild relatives and forms – Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids - Accomplishments.
3. Oilseeds - Sunflower and Safflower - Origin – Distribution of species – Wild relatives and forms – Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids – Accomplishments.

UNIT-V: Breeding objectives and methods of Plantation crops: (5 Hrs.)

1. Oilseeds - Mustard - Origin – Distribution of species – Wild relatives and forms – Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids - Accomplishments.
2. Oilseeds - Linseed and Niger - Origin – Distribution of species – Wild relatives and forms – Breeding objectives – Major breeding procedures (conventional and modern innovative approaches)

for development of hybrids / varieties - Seed production technology of varieties and hybrids – Accomplishments.

3. Oilseeds - Coconut and Oil palm - Origin – Distribution of species – Wild relatives and forms – Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids – Accomplishments.

Co-curricular Activities: (5 hrs.)

Experiential learning, Quizzes, Debate,Group discussions & Peer teaching.

Prescribed Textbooks:

- Allard, R.W. 1960. Principles of Plant Breeding. John Wiley & Sons, New York.
- Phundan Singh. 2006. Essential of Plant Breeding. Kalyani Publishers, Ludhiana.
- Poehlman, J.M. and Borthakur, D. 1995. Breeding of Asian Field Crops. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
- Sharma, J.R. 1994. Principles and Practices of Plant Breeding. Tata McGraw-Hill Publishing Co. Ltd., New Delhi.
- Kalloo, G.1994. Vegetable Breeding. Panima Educational Book Agency,New Delhi.
- Kumar, N.2006. Breeding of Horticultural Crops-Principles and Practices. New India Publishing Agency, New Delhi.
- George Acquaah. 2012. Principles of Plant Genetics and Breeding. Blackwell Publishing Ltd.,USA.
- Mono graphs available on specific crops.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

V SEMESTER **AGRICULTURE AND RURALDEVELOPMENT** Time:30hrs/week

AGRD 311P (1) **CROP IMPROVEMENT- I** Marks:50

PRACTICAL SYLLABUS

Objectives:

- To study about the breeding objectives and breeding procedures of various crops
- To study about the seed production technology of various crops
- To understand floral biology of crops for effective hybridization

Course Outcomes:

At the end of the course, students will be able to

CO1: Demonstrate emasculation and crossing techniques in each crop.

CO2: Explain the floral biology of each crop.

CO3: Summarize the mode of pollination of each crop to carry out effective emasculation procedures.

EXPERIMENTS:

1. Hybridization techniques and precautions to be taken, Floral morphology, selfing, emasculation and crossing techniques in field crops. **(5 Hrs.)**
2. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in rice. **(5 Hrs.)**
3. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Wheat. **(5 Hrs.)**
4. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Sorghum. **(5 Hrs.)**
5. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Pearl millet and Finger millet. **(5 Hrs.)**
6. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Chickpea and Pigeonpea. **(5 Hrs.)**

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

V SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time:30hrs/week

AGRD 319 (2) **RURAL INDUSTRIALIZATION & ENTREPRENEURSHIP** Marks:100

SYLLABUS

Objectives

O1: To understand the dynamics of rural industrialisation
O2: To analyze the structure and financing of rural industries
O3: To evaluate the socio-economic impact of rural industrial labour

Course Outcomes

At the end of the course, students will be able to
CO1: Understand the concept of rural industrialization
CO2: Explain the role of MSMEs and KVIC in promoting rural economic growth
CO3: Apply their knowledge of source financing and credit options to address industrial sickness.
CO4: Analyze the problems associated with rural labour and identify potential remedial measures.
CO5: Design strategies to improve rural industrialization.

UNIT- I: Introduction to Rural Industrialization (5 Hrs.)

1. Rural Industrialisation, Need and Importance - Growth of Rural Industries in India – Gandhian Approach and Modern Approach-Problems and Remedies of Rural Industrialisation.

UNIT- II: Rural Industries in India (5 Hrs.)

1. Rural Industries in India, Growth and Structure of Rural Industries, Current Status, Measures to Sustain Growth, Sickness – Remedial Measures.

UNIT- III: Small scale and Cottage Industries (5 Hrs.)

1. Small Scale and Cottage Industries in Rural India, Meaning, Definition, Role, Present Position, MSME – Industrial Policies and Programmes, Problems: KVIC and its Role.

UNIT- IV: Rural Industry Financing (5 Hrs.)

1. Rural Industrial Financing, Sources of Credit - Institutional and Non –Institutional -Role of Commercial Banks, Co-operatives, Grameena Banks and NABARD.

UNIT – V: Rural Industrial Labour (5 Hrs.)

1. Rural Industrial Labour, Meaning, Importance, Types - Organized and Unorganized Rural Industrial Labour – Rural Industrial Labour Problems - Labour Turnover – Migration.

Prescribed Textbooks:

- Vasant Desai: Rural Development in India, Himalaya Publishing House, Mumbai, 2012.
- Dutt and Sundaram- Indian Economy, S.Chand Publications, New Delhi, 2013-07-02.
- S.K. Mishra and V.K. Puri- Economics of Development and Planning, Himalaya Publishing House, Mumbai, 2012.

Co-curricular Activities: (5Hrs.)

PPT Presentation, weekend tests, Service Learning, Field Activities.

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

V SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time:15hrs/week

AGRD 321(1) **PROBLEMATIC SOILS AND THEIR MANAGEMENT** Marks:100

SYLLABUS

OBJECTIVES

O1: To identify and classify problematic soils, their extent and distribution in India

O2: To examine and manage salt and sodic soils

O3: To explore soil pollution and its remediation

COURSE OUTCOMES

At the end of the course students will be able to

CO1: Classify and map problematic soils.

CO2: Diagnose and manage salt and sodic soils.

CO3: Evaluate soil acidity and acid sulphate soils to give reclamation measures.

CO4: Analyze and manage land degradation and soil pollution.

CO5: Utilize modern technologies for soil health management.

UNIT- I: Introduction to Problematic Soils and Salinity Management (2 Hrs.)

1. Problem soils –Definition – Different types of problematic soils – Extent and distribution of problematic and wastelands soils in different agro-eco systems and in Andhra Pradesh.
2. Salt affected soils – Origin and formation - Distribution of salt affected soils in India and Andhra Pradesh - Characteristic features of saline, sodic and saline – sodic soils – Diagnostic criteria based on properties.
3. Saline soils – Visual symptoms for identification of saline soils – Build-up of salinity - Effect of salinity on plant growth and nutrient availability - Reclamation and management.

UNIT – II: Management of Acid, Sodic and Acid-Sulphate Soils (2 Hrs.)

1. Sodic soils - Visual symptoms for identification of sodic soils - Effect of sodicity on plant growth and nutrient availability - Reclamation and management.
2. Acid soils – Extent of area in India and Andhra Pradesh – Formation - Characteristics of acid soils – Sources of soil acidity – nutrient limitations and toxicity – Reclamation of acid soils - Different liming materials used for reclamation – Benefits of liming – Harmful effects of over liming.
3. Acid sulphate soils – Origin – Types – Characterization - Constraints and management.

UNIT – III: Land Degradation and Soil Pollution (2 Hrs.)

1. Land degradation - Eroded, compacted, flooded and water-logged soils – Biologically sick soils – Effects on plant growth – Management.
2. Polluted soils – Definition – Sources of pollution – Bio solid wastes –Industrial effluents (distillery, paper mill, tannery, textiles industrial effluents) – Mechanism of interaction of wastes with soil.
3. Soil pollution - Potentially toxic elements - Excessive use of fertilizers, pesticides and weedicides – Heavy metal contamination – Management.

UNIT – IV: Sustainable Land Management (2 Hrs.)

1. Bio-remediation of problem soils through Multi-Purpose Tree Species.
2. Taxonomic classification of soils - Land Capability Classification.
3. Land suitability classification - Index – Criteria - Different approaches–Land suitability for different crops.

UNIT – V: Advanced Techniques in Soil and Water Management (2 Hrs.)

1. Remote Sensing and GIS techniques in diagnosis, mapping and management of degraded and problematic soils.
2. Soil health and quality – Definition - Concepts – Soil resilience – Factors affecting soil quality (Physical, chemical and biological) – Assessment of soil quality - Management and improvement of soil quality.
3. Irrigation water – Quality and standard parameters - Classification based on ICAR, CSSRI and USDA criteria. Guidelines for judging quality of water - Utilization of saline water in agriculture.

Prescribed Textbooks:

- Indian Society of Soil Science. 2012. Fundamentals of Soil Science, IARI, New Delhi.
- Das, D. K. 2015. Introductory Soil Science. 4th Edition, Kalyani publishers, New Delhi.
- Soils of Andhra Pradesh, Monograph of I.V. Subbarao.

Co-curricular Activities: (5Hrs.)

Power Point Presentation, Weekend tests, Field Activities, Group Discussions, Model Presentation, Poster Presentation, etc

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
V SEMESTER **AGRICULTURE AND RURALDEVELOPMENT** Time:30hrs/week
AGRD 321P(1) **PROBLEMATIC SOILS AND THEIR MANAGEMENT** Marks:50
PRACTICAL SYLLABUS

Objectives:

O1: To identify and classify problematic soils, their extent and distribution in India

O2: To examine and manage salt and sodic soils

O3: To explore soil pollution and its remediation

Course Outcomes:

CO1: Explain identification of problematic soils and their management.

CO2: Discuss infiltration rates of light soils and infiltration rates of heavy soils.

CO3: Explain pH, EC of acid, saline and sodic soils.

EXPERIMENTS:

1. Field identification of problematic soils and visits to degraded lands. **(5 hrs)**
2. Determination of infiltration rates of light soils. **(5 hrs)**
3. Determination of infiltration rates of heavy soils. **(5 hrs)**
4. Determination of aggregate stability of sodic soils. **(5 hrs)**
5. Determination of pH, EC of acid, saline and sodic soils. **(5 hrs)**
6. Determination of ESP of sodic soils. **(5 hrs)**

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
V SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time:30hrs/week
AGRD 331(2) **PESTS OF FIELD CROPS & STORED GRAIN** Marks:100
SYLLABUS

OBJECTIVES

- To learn typical symptoms of damage by various phytophagous insects.
- To calculate doses of insecticides and their application techniques.
- To Identify major insect pests of rice and their damage symptoms

COURSE OUTCOMES

CO1: Describe pests of rice and general account on nature and type of damage by different arthropod pests.
CO2: Explain pests of sorghum and other millets for good plant growth.
CO3: Examine pests of cotton, jute, and pulses for effective plant protection.
CO4: Examine pests of oilseed crops for better plant protection.
CO5: Explain storage grain pests for effective storage in warehouses.

UNIT – I:

1. Introduction and pests of Rice **(5 Hrs.)**
2. General account on nature and type of damage by different arthropod pests. Scientific name, order, family, host range, distribution, marks of identification, bionomics, nature of damage, and management of major, minor insect pests and other important arthropod pests of various field crops.
3. Introduction of Economic Entomology and Economic Classification of Insect Pests.
4. Rice-Yellow stem borer and other borers, gall midge, brown - plant hopper, green leafhopper, hispa, leaf folder, ear head bug, grasshoppers, root weevil, swarming caterpillar, climbing cutworm, case worm, whorl maggot, leaf mite and panicle mite-IPM practices.

UNIT – II: Pests of millets and sugar cane (5 Hrs.)

1. Sorghum and other millets- Sorghum shoot fly, stem borer, pink borer, sorghum midge, ear head bug, red hairy caterpillar, deccan wingless grasshopper, aphids, maize shoot bug, flea beetle, blister beetles, ragi cutworm, ragi root aphid and army worm- IPM practices. Wheat- Ghujia weevil, ragi pink borer and termites- IPM practices.
2. Sugarcane- Early shoot borer, internode borer, top shoot borer, scales, leafhoppers, white grub, mealybugs, termites, whiteflies, woolly aphid and yellow mite- IPM Practices.

UNIT – III: Pests of fibre and pulse crops: (5 Hrs.)

1. Cotton- Spotted bollworm, American bollworm, pink bollworm, tobacco caterpillar, leafhopper, whiteflies, aphid, mites, thrips, red cotton bug, dusky cotton bug, leaf roller, stem weevil, grasshoppers, and mealybug - IPM Practices.
2. Jute- Semilooper, stem weevil, stem girdler and Bihar hairy caterpillar. Mesta- Hairy caterpillars, stem weevil, mealybugs, leafhopper and aphid. Sun hemp- Hairy caterpillars, stem borer and flea beetle. IPM Practices.

4. Pulses- Gram caterpillar, plume moth, pod fly, stem fly, spotted pod borer, cowpea aphid, cow bug, pod bug, leafhopper, stink bug, green pod boring caterpillar, blue butterflies, leaf Webber/borer and red gram mite. Soybean- Stem fly, stem girdler, ragi cutworm, leaf miner and whitefly- IPM Practices. Pea- pea leaf miner and pea stem fly.

UNIT – IV: Pests of oil seed and storage grains (5 Hrs.)

1. Castor-Semilooper, shoot and capsule borer, tobacco caterpillar, leafhopper, butterfly, whitefly, thrips, castor slug and mite- IPM Practices. Groundnut - White grub, leaf miner, red hairy caterpillar, tobacco caterpillar, leafhopper, thrips, aphid, pod bug, bud borer, wire worms and jewel beetle- IPM Practices.
2. Sesamum-Leaf and pod borer, gall fly and sphinx caterpillar. Safflower- Aphids and leaf eating caterpillars- IPM Practices.
3. Mustard- Aphid, sawfly, diamondback moth and painted bug. Sunflower- Helicoverpa and Spodoptera, leafhopper, Bihar hairy caterpillar and thrips - IPM Practices.
4. Stored grains Pests- Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain.
5. Stored grain Insect pests - Rice weevil, lesser grain borer, khapra beetle, pulse beetle, groundnut bruchid, flour beetles, saw-toothed beetle, cigarette beetle, angoumois grain moth and rice moth.

UNIT – V: Storage grain pests (5 Hrs.)

1. Stored grains - Non insect Pests- Mites, rodents, birds and microorganisms associated with stored grain - Storage structures and methods of grain storage and fundamental principles of grain store management.
2. Locusts- Locusts and their management, Mites- Economically important phytophagous mites of field crops and their management.
3. Nematodes-White tip nematode of rice, cyst and gall nematode of wheat, and their management.
4. Rodents- Rodents damaging field crops and stored grains - Keys for identification of rodents and their management.
5. Birds- Various birds infesting crops and their management.

Prescribed Textbooks:

- Vasantharaj David, B. and Rama Murthy V.V. 2016. Elements of Economic Entomology, Popular Book Depot, Coimbatore
- Vasantharaj David, B and Aanathakrishnan, T.N. 2006. General and Applied Entomology. Tata McGraw-Hill Publishing House, New Delhi.
- Nair MRGK. 1986. Insects and Mites of crops in India. Indian Council of Agricultural Research New Delhi.

Co-curricular Activities: (5Hrs.)

PPT Presentation, weekend tests, Service Learning, Field Activities.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
V SEMESTER **AGRICULTURE AND RURALDEVELOPMENT** Time: 30hrs/week
AGRD 331P(1) **PESTS OF FIELD CROPS & STORED GRAIN MANAGEMENT**Marks:50
PRACTICAL SYLLABUS

Objectives:

- To identify various insect pests
- To calculate the doses of insecticides
- To identify and control pests of rice, sugarcane

Course Outcomes:

CO1: Explain identification and symptoms of damage by various phytophagous insects.

CO2: Summarise Calculations on the doses of insecticides and their application techniques.

CO3: Explain pests of pulse crops and their damage symptoms. Identification of insect pests of oil seed crops and their damage symptoms.

EXPERIMENTS:

1. Typical symptoms of damage by various phytophagous insects. **(5hrs)**
2. Calculations on the doses of insecticides and their application techniques. **(5hrs)**
3. Identification of major insect pests of rice and their damage symptoms. **(5hrs)**
4. Identification of major insect and mite pests of sorghum, maize and other millets, and their damage symptoms. **(5hrs)**
5. Identification of insect pests of sugarcane and their damage symptoms. **(5hrs)**
6. Identification of insect pests of cotton, sunhemp and mesta and their damage symptoms. **(5hrs)**

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

V SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time:15hrs/week

AGRD 351(1) **PROTECTED CULTIVATION & POST-HARVEST** Marks:100

SYLLABUS

OBJECTIVES

O1: To learn the principles and significance of protected cultivation in modern agriculture.

O2: To understand crop selection and management practices for protected cultivation.

O3: To learn about climate control systems, irrigation technologies, and fertigation.

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Explain the significance and advantages of protected cultivation in modern agriculture.

CO2: Classify and outline types of greenhouses and their scientific principles.

CO3: Summarise the implementation of precision agriculture tools for resource optimisation and efficiency.

CO4: Apply integrated pest management (IPM) strategies for sustainable production.

CO5: Recap the sustainable and eco-friendly practices to minimise environmental impact.

UNIT – I: Introduction (2Hrs.)

1. Introduction to greenhouses - History, definition, greenhouse effect, advantages of green houses.
2. Brief description of types of greenhouses - Greenhouses based on shape, utility, construction, covering materials and cost, shade nets.
3. Plant response to greenhouse environments - Light, temperature, relative humidity, ventilation and carbon dioxide and environmental requirement of agriculture and horticulture crops inside green houses.
4. Equipment required for controlling greenhouse environment – Summer cooling and winter cooling, natural ventilation, forced ventilation and computers.

UNIT – II: Planning and design (2 Hrs.)

1. Planning of green house facility - Site selection and orientation, structural design and covering materials.
2. Materials for construction of greenhouses - Wood, galvanized iron, glass, polyethylene film, polyvinyl chloride film, Tefzel T2 film, fiberglass reinforced plastic rigid panel and acrylic and polycarbonate rigid panel.
3. Design criteria and constructional details of greenhouses - Construction of pipe framed greenhouses, material requirement, preparation of materials and procedure of erection.

UNIT – III: Greenhouse Equipment's: (2 Hrs.)

1. Greenhouse heating and distribution systems - Greenhouse utilization - Off-season drying of agricultural produce - Economic analysis of greenhouse production - Capital requirement, economics of production and conditions influencing returns.

2. Irrigation system used in greenhouses - Rules of watering, hand watering, perimeter watering, overhead sprinklers, boom watering and drip irrigation.
3. Important engineering properties such as physical, thermal and aero-dynamic properties of cereals, pulses and oil-seeds.

UNIT – IV: Post harvest equipment's (2 Hrs.)

1. Designing post-harvest equipment based on physical and thermal properties.
2. Winnowing - Manual and power operated winnowers, care and maintenance - Groundnut decorticators - Hand and power operated decorticators, principle of working, care and maintenance.
3. Moisture measurement - Equilibrium moisture content (EMC) – importance - Drying theory - Drying and dehydration.

UNIT – V: Dryers and processing of cereals (2 Hrs.)

1. Commercial grain dryers - Deep bed, flat bed, tray, fluidised bed, recirculated and solar dryers.
2. Material handling equipment - Bucket elevator and screw conveyor and their selection.
3. Primary processing of cereals, pulses and oilseeds - Cleaning, grading and packaging.

Prescribed Textbooks:

- Radha Manohar, K and Igathinathane. C. Greenhouse Technology and Management, 2nd Edition, BS Publications.
- Tiwari, G.N. Greenhouse Technology for Controlled Environment. Narosa Publishing house Pvt.Ltd. 3. Singh Brahma and Balraj Singh., 2014. Advances in Protected Cultivation, New India Publishing Company.
- Sahay, K.M. and Singh, K.K. 1994. Unit operations of Agricultural Processing. Vikas Publishing house Pvt. Ltd. New Delhi.
- Chakraverty, A. Post-Harvest Technology of cereals, pulses and oilseeds. Oxford & IBH publishing Co. Ltd., New Delhi.
- Ojha, T.P and Michael, A.M. Principles of Agricultural Engineering, Vol. I, Jain Brothers, Karol Bag, New Delhi.

Co-curricular Activities: (5Hrs.)

PPT Presentation, weekend tests, Service Learning, Field Activities.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
V SEMESTER **AGRICULTURE AND RURALDEVELOPMENT** Time: 30hrs/week
AGRD 351P(1) **PROTECTIVE CULTIVATION AND POST – HARVEST** Marks:50
PRACTICAL SYLLABUS

OBJECTIVES:

- To identify the different types of greenhouses.
- To identify the moisture measurements.
- To determine the aerodynamic properties of grains.

COURSE OUTCOMES:

CO1: Explain different types of greenhouses based on shape and functions and systems of green houses.
CO2: Discuss postharvest technology.
CO3: Explain determination of moisture content in grains.

EXPERIMENTS:

1. Study of different types of greenhouses based on shape, etc. **(5hrs)**
2. Visit to post-harvest technology units and laboratories. **(5hrs)**
3. Determination of moisture content of various grains by oven drying and infrared methods. **(5hrs)**
4. Determination of size, space, porosity, bulk density, etc., of grains. **(5hrs)**
5. Determination of aerodynamic properties of grains. **(5hrs)**
6. Cleaning and grading of grains, pulses and oilseeds. **(5hrs)**

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

V SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time:30hrs/week

AGRD 371 (2) **DISEASES OF FIELD CROPS AND THEIR** Marks:100

SYLLABUS

Objectives:

- To study the etiology and symptoms of diseases in field crops
- To understand the host-parasite relationship in field crops
- To study the management practices of various diseases for effective crop improvement

Course Outcomes:

At the end of the course, students will be able to

CO1: Understand management practices by the studying of various symptoms and etiology of field crops' diseases.

CO2: Explain different diseases and management of cereal crops for effective crop growth.

CO3: Understand the diseases and management of fiber crops for effective crop protection.

CO4: Explain the diseases and management practices of oilseed crops.

CO5: Understand various diseases and their management practices of pulses.

UNIT – I: Introduction: (5 Hrs.)

1. Study of etiology, symptoms, host-parasite relationship and specific management practices of the following diseases: Rice diseases – blast, brown spot, Sheath rot, Stem rot, Sheath blight, Bacterial leaf blight, Rice Tungro Disease.
2. Wheat diseases – Black or stem rust, loose smut, Karnal bunt, Powdery mildew.

UNIT – II: Diseases of Cereal crops (5 Hrs.)

1. Sorghum diseases – Anthracnose, rust, smut, downy mildew.
2. Maize diseases - Turcicum leaf blight, charcoal rot, downy mildew.
3. Bajra diseases – Downy mildew/green ear, rust, smut.
4. Finger millet diseases- Blast, smut, mosaic.

UNIT – III: Diseases of fiber crops (5 Hrs.)

1. Cotton diseases– Bacterial blight, Fusarium wilt, root rot, Helminthosporium leaf spot, rust.
2. Sugarcane diseases – red rot, ring spot, mosaic, ratoon stunting, rust.
3. Tobacco diseases –black shank, Damping off, Frog eye spot, Mosaic.

UNIT – IV: Diseases of Oilseed crops (5 Hrs.)

1. Groundnut diseases – Collar rot, Tikka leaf spots, Peanut stem necrosis disease, Kalahasti malady.
2. Sesamum diseases – Phyllody, powdery mildew, bacterial leaf spot.
3. Castor diseases – wilt, root rot, seedling blight, rust.
4. Sunflower diseases – leaf blight, rust, powdery mildew, downy mildew, mosaic, sunflower necrosis virus.

5. Mustard diseases – White rust, downy mildew, powdery mildew.

UNIT – V: Diseases of Pulses **(5 Hrs.)**

1. Red gram diseases – Phytophthora blight, wilt and bacterial leaf spot.
2. Bengal gram diseases – wilt, rust, stem and root rot.
3. Black gram and Green gram diseases – Powdery mildew, rust, Cercospora leaf spot, Dry root rot, Bacterial leaf spot, Yellow Mosaic virus.
4. Soybean diseases – Rhizoctonia blight, rust, Soybean mosaic; Pea diseases - downy mildew, powdery mildew and rust.
5. Cowpea diseases – Cowpea mosaic virus disease.; Lentil diseases - rust and wilt.

Prescribed Textbooks:

- Rangaswami, Gand K.Mahadevan. 2001. Diseases of crop plants in India. Prentice Hall of India Pvt.Ltd, New Delhi.
- Singh, R.S. 2005. Plant Diseases. Oxford & IBH Publications, New Delhi.

Co-curricular Activities: (5 Hrs.)

Field work, Herbarium (Disease leaves collection), Group discussions, Technology based learning, Peer teaching,Service Learning, Field visits.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

V SEMESTER **AGRICULTURE AND RURALDEVELOPMENT** Time: 30hrs/week

AGRD 371P(1) **DISEASES OF FIELD CROPS & THEIR MANAGEMENT** Marks:50

PRACTICAL SYLLABUS

Objectives:

- To study the etiology and symptoms of diseases in field crops
- To understand the host-parasite relationship in field crops
- To study the management practices of various diseases for effective crop improvement

Course Outcomes:

At the end of the course, students will be able to

CO1: Demonstrate various causes of diseases in field crops.

CO2: Identify the symptoms of various diseases in field crops.

CO3: Understand the various management practices for effective crop protection.

EXPERIMENTS:

Study of the symptoms, identification and histopathological studies of the following diseases:

1. Rice **(5hrs)**
2. Wheat, Sorghum and Bajra **(5hrs)**
3. Maize and Finger millet **(5hrs)**
4. Sugarcane **(5hrs)**
5. Tobacco diseases and Groundnut **(5hrs)**
6. Sunflower **(5hrs)**

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

V SEMESTER **VALUE ADDED COURSE** TIME: 2 HRS /WEEK

EE 5001(2) **ENVIRONMENTALEDUCATION** MAX.MARKS: 100

SYLLABUS

Course objective: A Generic Course intended to create awareness that the life of human beings is an integral part of environment and to inculcate the skills required to protect environment from all sides.

Learning outcomes: On completion of this course the students will be able to…..

- Explain the nature, components of an ecosystem and that humans are an integral part of nature.
- Analyse the importance of environment, the goods and services of a healthy biodiversity, dependence of humans on environment.
- Evaluate the causes and consequences of environmental destruction, population explosion, and assess global problems arising from anthropogenic activities.
- Discuss the laws/acts made by government to prevent pollution, to protect biodiversity and environment as a whole.
- Interpret international agreements and national movements, and realize citizen's role in protecting environment and nature.

Unit1: Environment and Natural Resources 06Hrs.

1. Multi disciplinary nature of environmental education; scope and importance.
2. Manson integral product and part of the Nature.
3. A brief account of land, forest and water resources in India and their importance.
4. Biodiversity: Definition; importance of Biodiversity-ecological, consumptive, productive, social, ethical and moral, aesthetic, and option value.
5. Levels of Biodiversity: genetic, species and ecosystem diversity.

Unit-2: Environmental degradation and impacts 10Hrs

1. Human population growth and its impacts on environment; land use change, land degradation, soil erosion and desertification.
2. Use and over-exploitation of surface and ground water, construction of dams, floods, conflicts over water (within India).
3. Deforestation: Causes and effects due to expansion of agriculture, fire wood, mining, forest fires and building of new habitats.
4. Non-renewable energy resources, their utilization and influences.
5. A brief account of air, water, soil and noise pollutions; Biological, industrial and solid wastes in urban areas. Human health and economic risks.
6. Green house effect-global warming; ocean acidification, ozone layer depletion, acid rains and impacts on human communities and agriculture.

7. Threats to biodiversity: Natural calamities, habitat destruction and fragmentation, over exploitation, hunting and poaching, introduction of exotic species, pollution, predator and pest control.

Unit 3: Conservation of Environment 10 Hrs

1. Conceptofsustainabilityandsustainabledevelopmentwithjudicioususeofland, water and forest resources; a forestation.
2. Control measures for various types of pollution; use of renewable and alternate sources of energy.
3. Solid waste management: Control measures of urban and industrial waste.
4. Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.
5. Environment Laws: Environment Protection Act; Act; Wild life Protection Act; Forest Conservation Act.
6. International agreements: Montreal and Kyoto protocols; Environmental movements: Bishnois of Rajasthan, Chipko, and Silent valley

Suggested text book:

- Erach Barucha (2004)Textbook of Environmental Studies for Under graduate courses

(Prepared for University Grants Commission) Universities Press.

- Purnima Smarath(2018)Environmental studies Kalyani Publishers, Ludhiana

Reference books:

- Odum, E.P., Odum, H.T. & Andrews, J. (1971) Fundamentals of Ecology. Philadelphia: Saunders.
- Pepper,I.L., Gerba,C.P. & Brusseau,M.L.(2011).
- Environmental and Pollution Science. Academic Press.
- Raven, P.H.Hassenzahl, D.M.&Berg,L.R.(2012)
- Environment. 8th edition. John Wiley & Sons.
- Singh, J.S., Singh, S.P. and Gupta, S.R. (2014) Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
- Sen gupta, R. (2003) Ecology and economics: An approach to sustainable development.OUP.
- Wilson, E. O. (2006) The Creation: An appeal to save life on earth. New York: Norton.
- Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll (2006) Principles of Conservation Biology. Sunderland: Sinauer Associates,

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

B. SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

C. V SEMESTER **AGRICULTURE AND RURALDEVELOPMENT**

Time:30hrs/week

HORD 387 (1) **PRODUCTION TECHNOLOGY OF FLOWER CROPS** Marks:100

SYLLABUS

OBJECTIVES

O1: To identify flowers (cut flowers & loose flowers)

O2: To understand the post-harvest conditions, storage of cut flowers

O3: To understand the scientific cultivation methods of flower crops **COURSE OUTCOMES**

At the end of the course, students will be able to

CO1: Explain the importance of research institutes in our country.

CO2: Apply the various propagation techniques for raising flower crops.

CO3: Summarise the importance of plant growth regulators in flower crop production.

CO4: Classify and outline the preparation of essential oils.

CO5: Recap the post-harvest practices in flower crops

UNIT – I: Introduction (2Hrs.)

1. Definition of Floriculture– Importance and Scope of floriculture industry in India - Present Status of floriculture in India – Area and Production of floricultural Products in India – International Scenario.

2. 2.Production technology of Rose – Introduction- origin and distribution- Classification- Species and varieties- Climate and soil requirements- Propagation – Rootstocks- Stock scion compatibility - Land preparation- planting- Manures and fertilizers- Cultural operations (pruning pinching and mulching) harvesting- Post harvest management- Yield and rose biproducts.

UNIT – II Package of practices for Marigold and Chrysanthemum (2Hrs.)

1. Marigold - Introduction- Origin and distribution- Classification- Species and varieties- Climate and soil requirements- Propagation- Land preparation- Planting Manures and fertilizers- Cultural operations - Defoliation- Soil loosening- Shading use of growth regulators- Physiological disorders- Harvesting- Post harvest management and yield.

2. Chrysanthemum: Introduction, origin and distribution, classification, species and varieties, climate and soil requirements, propagation – Rootstocks, Stock scion compatibility, land preparation, planting, Manures and fertilizers, cultural operations (pruning, pinching and mulching) use of growth regulators, physiological disorders, harvesting, post-harvest management, yield

UNIT–III: (2Hrs.)

1. Dahlia Introduction, origin and distribution, classification, species and varieties,climate and soil requirements, propagation, land preparation, planting. Manures and fertilizers, cultural operations, (pinching and disbudding) use of growth regulators, harvesting, post-harvest management and yield.

2. China aster, Crossandra: Introduction, origin and distribution, classification, species and varieties, climate and soil requirements, propagation, land preparation, planting., Manures and fertilizers, cultural operations, (pinching and disbudding) use of growth regulators, harvesting, post-harvest management and yield.

3. Anthurium and Gerbera: Introduction, origin and distribution, classification, species and varieties, climate and shade requirements, growing media, propagation, systems of growing, planting, fertigation, cultural operations, de-suckering, defoliation, use of growth regulators, physiological disorders, harvesting, grades, post-harvest management and yield

UNIT – IV (2Hrs.)

1. Orchids: Introduction, origin and distribution, classification, species and varieties, climate and shade requirements, growing media, propagation, systems of growing, planting, fertigation, cultural operations, de-suckering, defoliation, use of growth regulators, physiological disorders, harvesting, grades, post-harvest management and yield.

2. Carnation and Gladiolus, Introduction, origin and distribution, classification, species and varieties, climate and soil requirements, propagation, land preparation, planting, Manures and

fertilizers, cultural operations, (pinching and disbudding) use of growth regulators, physiological disorders, harvesting, post-harvest management and yield.

3. Jasmin and Tuberose: Introduction, origin and distribution, classification, species and varieties, climate and soil requirements, propagation, land preparation, planting, Manures and fertilizers, cultural operations, (pinching and disbudding) use of growth regulators, physiological disorders, harvesting, post-harvest management and yield

UNIT-V: (2Hrs.)

1. Post-harvest technology of cut flowers – causes for deterioration of cut flower quality – Food depletion – Bacterial and fungal infections – Maturation and ageing – Wilting – Bruising – Temperature – Ethylene – Water – Factors affecting cut flower longevity – Handling – Harvest stage – Grading and Bunching – Packaging – Pre – cooling – Storage – Floral preservatives viz., (Pulsing solution – Bud opening solution – Vase solution – Conditioning) – Sanitation.

2. Dehydration technique for drying of flowers – Importance – Pot – pourri – Dehydration methods – Air drying – Embedding and drying – viz., room drying – Sun drying – hot air oven – vacuum drying – microwave drying – Embedding individual flower – embedding individual flower with stem – Embedding branch with flowers – Press drying (simple method, herbarium method).

Prescribed Textbooks:

- A.K.Singh.2006.Flower crops, cultivation and management. New India publishing agency, Pitampura, New Delhi.
- T.K. Bose, L.P. Yadav, P. Patil, P. Das and V.A. Partha Sarthy.2003. Commercial flowers. Partha Sankar Basu, Nayaudyog,206, Bidhan Sarani, Kolkata-700006 S.K. Bhattacharjee and L.C. De. 2003.
- Advanced Commercial Floriculture. Aavishkar Publishers, Distributors, Jaipur (Rajasthan) India. Dewasish Choudhary and Amal Mehta. 2010.

- Flower crops cultivation and management. Oxford book company Jaipur, India. Randhawa, G.S. Amitabha Mukhopadhyay, 2004. Floriculture in India. Allied Publishers Pvt. Ltd: Arora, J.S. 2006. Introductory Ornamental Horticulture. Kalyani Publishers, Ludhiana - 141 008.

- Prof. Bhattacharjee, S.K. Advanced Commercial Floriculture. Aavishkar Publishers Distributors, Jaipur - 320 003 Prof. V.L. Sheela, 2008. Flower for trade . New India Publishing Agency, Pitampura, New Delhi-110088

Co-curricular Activities: **(5Hrs.)**

Presentation, Assignments, Peer teaching,Group Discussion, Quizzes, Field activities.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
V SEMESTER **AGRICULTURE AND RURALDEVELOPMENT** Time: 30hrs/week

HORD 387P(1) **PRODUCTION TECHNOLOGY OF FLOWER CROPS PRACTICAL PRACTICAL SYLLABUS** Marks:50

Objectives

O1: To Identify Flowers (cut flowers & loose flowers)

O2: To understand the post-harvest conditions, storage of cut flowers

O3: To understand the scientific cultivation methods of flower crops

Course Outcomes

At the end of the course, students will be able to

CO1: Apply the various propagation techniques for raising of flower crops.

CO2: Summarize the importance of plant growth regulators in flower crop production.

CO3: Recap the post-harvest practices in flower crops

EXPERIMENTS:

1. Identification and description of annuals, biennials and herbaceous perennials **(5 Hrs)**
2. Study and practice of making different Flower arrangements and preparation of floral bouquets.
3. Bonsai practicing and training and Pruning practices in flower crops. **(5 Hrs)**
4. Identification of important flower crops and their varieties (5 Hrs)
5. Layering methods for Jasmine propagation, Chrysanthemum (5 Hrs)
6. Field visit to commercial flower growing area (5 Hrs)

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

VI SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time:30hrs/week

AGRD 303(2) **RAINFED AGRICULTURE & WATERSHED MANAGEMENT** Marks:100

SYLLABUS

Objectives:

O1: To learn about basic knowledge of rain fed agriculture and watershed management.

O2: To Study about crop adaptation and mitigation strategies, crop planning and crop management techniques.

O3: To understand production of crops, forage, fruits, fuel and timber in rainfed areas.

Course Outcomes

At the end of the course, students will be able to

CO1: Explain about rainfed agriculture and its introduction, problem and prospects in India.

CO2: Describe farming practices that rely on rainfall for water.

CO3: Analyze objective, principles and components of watershed management.

CO4: Summarize the Fertilizer schedule which helps in obtaining higher production of Rainfed crops.

CO5: Explain the better utilization of water to the with conservation techniques.

UNIT – I: **(5 Hrs.)**

INTRODUCTION TO RAINFED AGRICULTURE

1. Rainfed agriculture – introduction and definition – dimensions of the problem – area and production from dry lands in India and Andhra Pradesh –History of rainfed agriculture and watersheds in India.
2. Problems and prospects of rainfed agriculture in India – climate – rainfall pattern – distribution – variabilities of rainfall – short rainy season – high intensity rainfall.
3. Problems and prospects of rainfed agriculture in India - soil characteristics – soil fertility status –soil moisture storage and retention capacity – heavy weed infestation-soil crust and their effect on crop growth and soils-its management.
4. Drought – definition – types of drought – effect of water deficits on physio morphological characteristics of the plants.
5. Mechanism of crop adaptation under moisture deficit condition - management strategies for drought.

UNIT – II: **(5 Hrs.)**

METHODS OF SOIL CONSERVATION

1. Tillage for rainfed crops – off-season tillage – primary tillage –secondary tillage – year-round tillage – sub soiling – setline cultivation.
2. Modern concepts of tillage- minimum tillage and zero tillage.
3. Soil erosion – definition – losses due to erosion – types of water and wind erosion – nature and extent of wind and water erosion – factors affecting erosion – universal soil loss equation.
4. AGRD 303 (2) ::2::

5. Management of crops in rainfed areas - Agronomic measures of soil and water conservation – choice of crop – crop geometry – tillage.
6. Contour cultivation – strip cropping – cover cropping – mulching – cropping systems and weed control - Mechanical measures of soil and water management.

UNIT – III: **(5 Hrs.)**

WATERSHED MANAGEMENT IN RAINFED AREAS

1. Watershed – definition – concept— objectives and principles of watershed management.
2. Components of watershed development programme – factors affecting watershed management.
3. Water harvesting – importance, its techniques- Water harvesting structures – arid region – runoff farming – water spreading.
4. Micro catchments – semi arid region – farm ponds, check dams – percolation tanks – dug wells – life saving irrigation.
5. In-situ moisture conservation measures – bund forming – bunding, ridge and furrow system – conservation furrows- inter plot water harvesting, mulching – Broad Bed and Furrow (BBF) and levelling.

UNIT – IV: **(5 Hrs.)**

FERTILIZER USAGE IN DRYLAND AREAS

1. Fertilizer use in rainfed areas – use of organic manures.
2. Introduction of legumes in crop rotation– organic recycling and bio-fertilizer use in rainfed agriculture – time and method of fertilizer application.
3. Efficient crops and varieties – cropping systems in rainfed areas – intercropping – advantages
4. Efficient inter cropping systems in different rainfed regions of Andhra Pradesh.
5. Contingent crop planning for aberrant weather conditions in red and black soils.

UNIT – V: **(5 Hrs.)**

AGRONOMIC MEASURES OF CROP MANAGEMENT

1. Evapotranspiration – measures to reduce evapotranspiration – weeding, use of mulches, chemicals.
2. Windbreaks and shelterbelts.
3. Land capability classification – alternate land use system.
4. Efficient utilization of water through soil and crop management practices.
5. Agronomic measures - mechanical measures for soil and water conservation – gully control – bench terraces – contour terracing – graded bund.

Prescribed Textbooks:

- Reddy, S. R. and Prabhakar Reddy, G. 2015. Dryland Agriculture. Kalyani Publishers.
- Arnon,I. 1972. Crop Production in Dry Regions (Vol.I), Leonard Hill Pub. Co, London.
- Dhruva Narayana, V.V., Sastry, G.S. and Patnaiak, V.S. 1999. Watershed Management in India. ICAR, New Delhi.

Co-curricular Activities: **(5Hrs.)**

PPT Presentation, weekend tests, Service Learning, Field Activities.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
VI SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time:30hrs/week
AGRD 303 P(1) **RAINFED AGRICULTURE & WATER MANAGEMENT** Marks:50
PRACTICAL SYLLABUS

Objectives:

O1: To learn about basic knowledge of rain fed agriculture and watershed management.

O2: To Study about crop adaptation and mitigation strategies, crop planning and crop management techniques.

O3: To understand production of crops, forage, fruits, fuel and timber in rainfed areas.

Course Outcomes

At the end of the course, students will be able to

CO1: Discuss climatic classification, rainfall analysis.

CO2: Explain onset and withdrawal of monsoons and cropping patterns for different areas.

CO3: Outline meteorological data for rainfall variability.

EXPERIMENTS:

- Climate classification. **(5 Hrs)**
- Study on cropping patterns of different dryland areas. **(5 Hrs)**
- Mapping of dryland areas in India. **(5 Hrs)**
- Interpretation of meteorological data for rainfall variability. **(5 Hrs)**
- Scheduling of supplemental irrigation based on crop ET demand. **(5 Hrs)**
- Modern technology inventions that helpful in dryland areas **(5 Hrs)**

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR

VI SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time:30hrs/week

AGRD 312 (2) **CROP IMPROVEMENT-II** Marks:100

SYLLABUS

Objectives

- To study about the breeding objectives and breeding procedures of various crops
- To study about the seed production technology of various crops
- To understand floral biology of crops for effective hybridization

Course Outcomes

At the end of the course, students will be able to

CO1: Understand breeding objectives for breeding self and cross pollinated crops.

CO2: Explain breeding procedures and seed production in Solanaceae crops.

CO3: Elucidate breeding procedures and seed production in cucurbits and tubers.

CO4: Describe breeding procedures and seed production in fruit crops.

CO5: Demonstrate breeding procedures and seed production in flower crops.

UNIT-I: Breeding objectives and procedures in fiber and sugar crops (5 hrs.)

1. Cotton– origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.
2. Jute- origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.
3. Sugarcane– origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.
4. Potato - origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.

UNIT-II: Breeding objectives and procedures in Solanaceae crops (5 hrs.)

1. Tobacco– origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.

2. Tomato- origin – distribution– wild relatives and forms –breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.

3. Brinjal - origin – distribution – wild relatives and forms –breeding objectives –
4. breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.
5. Chilli - origin – distribution– wild relatives and forms –breeding objectives –
6. breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments
7. Okra - origin – distribution– wild relatives and forms –breeding objectives –
8. breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments

UNIT- III: Breeding objectives and procedures in Cucurbits and tubers (5 hrs.)

1. Vegetables-Cucumber- origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties- Seed production technology of varieties and hybrids – accomplishments.
2. Cabbage - origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.
3. Cauliflower - origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.
4. Garlic - origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.
5. Onion - origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.

UNIT- IV: Breeding objectives and procedures in fruit crops (5 hrs.)

1. Banana -origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.
2. Guava - origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.
3. Mango - origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.
4. Papaya - origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.
5. Lemon - origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.
6. Apple - origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.

UNIT-V: Breeding objectives and procedures in flower crops (5 hrs.)

1. Pomegranate -origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.
2. Sapota - origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.
3. Rose - origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.
4. Jasmine- origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.
5. Chrysanthemum- origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.

6. Marigold - origin – distribution– wild relatives and forms – breeding objectives – breeding procedures for development of hybrids / varieties - Seed production technology of varieties and hybrids – accomplishments.

Co-curricular Activities: (5 hrs.)

Experiential learning, Quizzes, Debate, Group discussions & Peer teaching.

PRESCRIBED TEXTBOOKS:

- Allard, R.W. 1960. Principles of Plant Breeding. John Wiley & Sons, New York.
- Phundan Singh. 2006. Essential of Plant Breeding. Kalyani Publishers, Ludhiana
- Poehlman, J.M. and Borthakur, D. 1995. Breeding of Asian Field Crops. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
- Sharma, J.R. 1994. Principles and Practice of Plant Breeding. Tata McGraw-Hill Publishing Co. Ltd., New Delhi.
- Kalloo, G.1994. Vegetable Breeding. Panima Educational Book Agency, New Delhi.
- Kumar, N. 2006. Breeding of Horticultural Crops – Principles and Practices. New India Publishing Agency, New Delhi.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
VI SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT**
Time:30hrs/week
GPBR 312P(1) **CROP IMPROVEMENT – II** Marks:50
PRACTICAL SYLLABUS

Objectives:

- To study about the breeding objectives and breeding procedures of various crops
- To study about the seed production technology of various crops
- To understand floral biology of crops for effective hybridization

Course Outcomes:

At the end of the course, students will be able to

CO1: Demonstrate emasculation and crossing techniques in each crop.

CO2: Explain the floral biology of each crop.

CO3: Summarize the mode of pollination of each crop to carry out effective emasculation procedures.

Experiments:

1. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Cotton and Jute. **(5 hrs.)**
2. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Sugarcane and Tobacco. **(5 hrs.)**
3. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Tomato and Okra. **(5 hrs.)**
4. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Garlic and Onion. **(5 hrs.)**
5. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Banana and Mango. **(5 hrs.)**
6. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Papaya and Guava. **(5 hrs.)**

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
VI SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT**
Time:15hrs/week
AGRD 320(1) **COMMUNICATION AND PERSONALITY DEVELOPMENT**
Marks:100
SYLLABUS

OBJECTIVES:

- To develop effective spoken and written communication skills
- To encourage self-confidence in the individuals by mastering interpersonal skills
- To enhance team management skills and leadership skills

COURSE OUTCOMES

At the end of the course, students will be able to

CO1: Enhance verbal and non-verbal communication skills for effective impact on people.

CO2: Access various suggestions to improve public speaking skills and group discussions.

CO3: Explore different theories of personality development.

CO4: Learn negotiation skills and manage stress and conflicts in the organisation.

CO5: Increase creativity to build effective teamwork.

UNIT - I: Introduction to Communication Skills (5 Hrs.)

1. Communication - Meaning and process of communication, verbal and nonverbal communication.
2. Communication skills - Structural and functional grammar.
3. Listening and note taking, writing skills, oral presentation skills.
4. Voice modulation basics and their usage for meaningful impact on people.

UNIT – II: Verbal Communication Skills (5 Hrs.)

1. Field diary and lab record; indexing, footnote and bibliographic procedures.
2. Reading and comprehension of general and technical articles and precise writing - summarizing, abstracting; individual group presentations.
3. Extempore, impromptu and prepared presentations, public speaking; group discussion - Organizing seminars and conferences.

UNIT – III: Non-Verbal Communication Skills (5 Hrs.)

1. Human behaviour - Domains and components of behaviour.

2. Personality and personality development - Meaning, scope, importance, factors influencing personality - Traits and type, approaches.
3. Personality theories.

UNIT – IV: Goals in Personality Development (5 Hrs.)

1. Importance of wants, desires, needs, drives, motives, aspirations, interests, objectives and goals in personality development.
2. Transactional analysis - Importance, methods and strategies.
3. Negotiation skills, stress management and conflict management - Meaning, concept, steps and techniques.

UNIT – V: Emotional Intelligence and Teamwork (5 Hrs.)

1. Emotional intelligence - Meaning, concept and importance.
2. Creativity - Meaning, concept, components and characteristics of creative people.
3. Team work - Meaning, concept, characteristic features of effective teams, types of teams, factors affecting and role of team work.

Co-curricular Activities: (5 hrs.)

Quizzes, Debate,Group discussions, Service Learning & Peer teaching.

PRESCRIBED TEXTBOOKS:

12. Dangi K.L., S.S. Sisoda, Pravesh Singh Chauhan and Yogita Ranavat. A Textbook of Communication Skills. Agrotech Publications.
13. Eric Berne. 1964. Games People Play-The Psychology of Human Relationship. Grove Press Publishers.
14. Scott Bill. 1981. Skills of Negotiating.
15. Goleman Daniel. 1995. Emotional Intelligence.
16. Ratan Reddy B and Supriya Reddy. Soft Skills for Professional Excellence.
17. Shivaraman K. 2009. Communication Skills. APH.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
VI SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT**
Time:30hrs/week
AGRD 332 (2) **PEST OF HORTICULTURE CROPS & BENEFICIAL INSECTS** Marks:100

SYLLABUS

OBJECTIVES:

- To impart adequate knowledge to students, both in theory and practice.
- To diagnose a variety of horticultural crop problems related to insect and non-insect pests.
- To comprehend their life histories and damages and to be able to recommend management strategies.

COURSE OUTCOMES:

CO1: Explain all major pests of crops as regards their taxonomic position, distribution, host range, life history, nature and symptoms of damage of vegetable crops.

CO2: Explain Seasonal abundance and their management of pests of fruit crops.

CO3: Discuss minor pests, their taxonomic position, nature and symptoms of damage of spice crops and study of silk moth.

CO4: Explain Management of bee keeping.

CO5: Explain lac culture.

UNIT – I: PESTS OF VEGETABLE CROPS (5 Hrs.)

1. General account on nature and type of damage by different arthropod pests. Scientific name, order, family, host range, distribution, marks of identification, bionomics, nature of damage, and management of major, minor insect pests and other important arthropod pests of various vegetable crops, fruit crops, plantation crops, ornamental crops, narcotics, spices and condiments.
2. Brinjal- Epilachna beetle, shoot and fruit borer, stem borer, mealy bug, aphid, leafhopper, lacewing bug, leaf webber and red spider mite- IPM practices.
3. Bhendi- Shoot and fruit borer, leafhopper and whitefly and spider mite - TomatoSerpentine leaf miner, South American Leaf miner/ Tomato pink worm, fruit borer and whitefly - IPM practices.
4. Cucurbits- Fruit flies, pumpkin beetles, semilooper, serpentine leaf miner and pumpkin leaf eating caterpillar - Coccinia-Coccinia gall fly and aphids - IPM practices.
5. Crucifers- Diamond back moth, cabbage head borer, leaf webber, aphid, painted bug, tobacco caterpillar and cabbage butterfly - IPM practices.

6. Potato- Tuber moth - Sweet potato - Sweet potato weevil, hairy caterpillar, tortoise beetle - Moringa- Hairy caterpillar, budworm, leaf webber and pod fly – Chillies Thrips, pod borers, aphid, mites, blossom midge - Amaranthus- Leaf eating caterpillar, stem weevil - IPM practices.
7. Mango- Leafhoppers, stem borer, nut weevil, fruit fly, shoot borer, fruit borer, mealybug, aphids, leaf webber, termites, thrips, red tree ant, leaf gall midges and red spider mite - IPM practices.

UNIT – II: PESTS OF FRUIT CROPS (6 Hrs.)

1. Citrus- Butterfly, fruit sucking moths, leaf miner, psylla, rust mite, bark eating caterpillar, black fly and leaf mite.
2. Grapevine- Flea beetle, thrips, mealybug, stem girdler, stem borer, leaf eating caterpillars and root grub - IPM practices.
3. Cashew- Tree borer, shoot and blossom webber, tea mosquito bug, thrips and leaf miner Pomegranate- Butterfly, thrips and fruit sucking moths - IPM practices.
4. Guava- Tea mosquito bug, mealybug, fruit flies and spiralling whitefly – Sapota Leaf webber, parijatha hairy caterpillar, mealybugs - Ber- Fruit fly, fruit borer and fruit weevil.
5. Banana- Rhizome weevil, skipper, aphid and pseudostem weevil - Papaya whiteflies, mealybugs and thrips - Apple - Woolly aphid and Codling moth - Custard apple- Mealybug - IPM practices
6. Coconut- Black headed caterpillar, rhinoceros beetle, red palm weevil, slug, termites, scale and mite - Oil palm- Black headed caterpillar, rhinoceros beetle and red palm weevil - IPM practices.

UNIT – III: Pests of spice crops and study of Silk worms (6 Hrs.)

1. Arecanut- Scales - Cocoa - Scales - Cardamom- Thrips - Pepper- Pollu beetle and shoot borer - Eucalyptus - Gall wasp - Neem - Tea mosquito bug and white grub - IPM practices.
2. Turmeric and ginger- Rhizome fly and Lace wing bug - Betelvine- Shoot bug and tobacco caterpillar - Onion- Thrips and Spodoptera exigua - Coriander- Aphids and leaf eating caterpillar - Rose- Thrips, scales, leaf eating caterpillars and chafer beetles - Jasmine- Stink bug, bud worm and gall mite - Chrysanthemum- Aphid- IPM practices - Tobacco-Tobacco caterpillar, aphid, whitefly and stem borer - CoffeeWhite borer, red borer and green scale; Tea- Tea mosquito bug, thrips, red spider mite, pink mite, purple mite and scarlet mite- IPM practices.
3. Economically important mite, nematode (vegetables, citrus, banana and coconut), rodent (coconut) and bird pests of horticultural crops and their management.

4. Beneficial insects – Importance of silkworm, honeybee, lac insects, predators, parasitoids, pollinators, weed killers and scavengers.
5. Species of Silkworms - Characteristic features of Mulberry Silkworm, Tasar Silkworm, Eri Silkworm and Muga Silkworm and their hosts- Biology – Voltinism - Ahimsa silk.
6. Establishment of mulberry garden – Planting season and land preparation, preparation of planting material - Irrigation- spacing, varieties, planting inter cultivation, fertilization, irrigation, leaf harvest and leaf yield - Mulberry Planting under rainfed and irrigated conditions - Spacing and preparation of pits, planting, fertilization, inter-cultivation, maintenance, soil moisture conservation and leaf harvest - Pests and diseases of mulberry plants and their management - Rearing house, rearing equipment and appliances-rearing stand, chawki rearing trays, late age rearing trays, paraffin wax coated paper, bird feathers, bed cleaning nets, chopsticks, rubber foam, ant well, mountages, chopping knife, chopping board, feeding basins, disinfection and hygiene in rearing house.

UNIT – IV: Silk worm rearing and bee keeping (5 Hrs.)

1. Mulberry silkworm races - Grainage centres, brushing of silkworm larvae, young age and late age silkworm rearing - Effect of temperature, humidity, air current and photoperiod - Leaf quality and leaf maturity on larval growth and survival - Feeding of late instars, bed cleaning and bed spacing for IV and V instars
2. Mounting- mountages, mounting density, harvesting and assessment of cocoon yield and cocoon characters for marketing - Defective cocoons.
3. Silk worm diseases- Pebrine- Symptoms, mode of transmission, stages of contamination and intensity, detection and control - Viral diseases- Nucleo polyhedro Virus and Cytoplasmic Polyhedro Virus - Symptoms, prevention and control. Grasserie - Symptoms, source of contamination, prevention and control - Infectious Flacherie - Symptoms, prevention and control - Fungal Diseases- White muscardine- Source of infection, symptoms, prevention and control - Uzi fly – Biology, nature of damage and symptoms and management.
4. Beekeeping- Importance and multiple source of income - Species of Honey bees Rock bee, Little bee, Indian honey bee, European bee and Dammar bee - Bee biology Life cycle - Caste determination in honey bees- Structural adaptations of honeybees.
5. Commercial methods of rearing, – Different types of the hive- Equipment - Smoker, bee veil, gloves, honey extractor, queen gate, queen excluder sheet, drone extruder, drone trap, comb foundation sheet, dummy division board, swarm trap, bee brush, feeder, queen cage and queen cell protector - Colony management in different seasons, winter, summer and rainy seasons.

6. Bee pasturage – Different species of pollen and nectar yielding plants- Honey flow season and dearth period – Communication in bees – Round dance and wag tail dance- Management of bees for crop pollination – Queen bee substance -Honey extraction, testing of honey, honey composition and value, bee wax, pollen, royal jelly, propolis, venom and its uses.

UNIT – V: Bee keeping and beneficial insects (5 Hrs.)

1. Enemies of bees and bee brood - Nature of damage and management of Greater wax moth, lesser wax moth, wax beetle, wasps, black ants, birds etc., - Nature of damage and management of honey bee - mites, Acarapis woodi, Varroa jacobsoni and Tropilaelaps clareae.

2. Bee diseases – Nature of damage and management of American foul brood disease, European foul brood disease, Sac brood disease, Thai sac brood disease, Chalk brood, stone brood disease, Nosema and Amoeba disease - Colony collapse disorder in bees.
3. Lac insect- Different species, morphology, behaviour, host plants, inoculation methods, natural enemies of lac insect and their management - Lac production – Processing, different forms of lac- raw lac, seed lac, shellac and lac by - products. Recent applications of lac.

4. Identification of biological control agents - Insect predators and parasitoids, pathogens, entomopathogenic nematodes.

5. Insect orders bearing predators and parasitoids used in pest control and their key identification characters (Dictyoptera: Mantidae; Hemiptera: Reduviidae, Anthocoridae, Lygaeidae, Pentatomidae; Neuroptera: Chrysopidae, Myrmeleontidae, Hemerobiidae; Coleoptera: Carabidae, Cicindelidae, Coccinellidae; Diptera: Asilidae, Tachinidae, Syrphidae; Lepidoptera: Noctuidae, Lycaenidae, Epipyropidae, Pyralidae; Hymenoptera: Vespidae, Braconidae, Ichneumonidae, Chalcididae, Trichogrammatidae, Platygasteridae, Elasmidae, Eulophidae, Scelionidae and Strepsiptera).
6. Mass production/multiplication methods of predators (Cheilomenes and Chrysoperla) parasitoids (Goniozus nephantidis).
7. Important species of pollinators, weed killers, and scavengers and their significance.

Prescribed Textbooks:

- Vasantharaj David, B. and V.V. Rama Murthy (2016). Elements of Economic Entomology, Popular Book Depot, Coimbatore.
- Butani, D.K. and Jotwani, M.G. 1984. Insects in Vegetables. Periodical Export Book Agency, New Delhi.
- Butani, D. K. 1984. Insects and Fruits. Periodical Export Book Agency, New Delhi.

- Ganga, G and Sulochana Chetty, 1997. Introduction to Sericulture, Oxford and IBH publishing Co. Pvt. Ltd., New Delhi
- Hisao Aragu 1994. Principles of Sericulture, Oxford and IBH publishing Co. Pvt. Ltd., New Delhi.
- Singh, S.1975. Bee Keeping in India - Indian Council of Agriculture research, New Delhi.

Co-curricular Activities: **(5Hrs.)**

PPT Presentation, weekend tests, Field Activities.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
VI SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT**
Time:30hrs/week
AGRD 332P (1) **PEST OF HORTICULTURE CROPS & BENEFICIAL INSECTS**
PRACTICAL SYLLABUS Marks:50

OBJECTIVES:

- To explain the systems and identification of vegetables pests.
- To explain the systems and identification of fruits pests.
- To explain management of pests.

Course Outcomes:

CO1: Explain identification, symptoms and management of insect pests of solanaceous and malvaceous vegetables.

CO2: Explain identification, symptoms and management of insect pests of crucifers and cucurbits.

CO3: Discuss identification, symptoms and management of insect pests of tuber crops and chilli.

EXPERIMENTS:

1. Identification of insect pests of Solanaceous and Malvaceous vegetables and their damage symptoms. **(5Hrs.)**
2. Identification of insect pests of Cruciferous and Cucurbitaceous vegetables and their damage symptoms. **(5Hrs.)**
3. Identification of insect pests of leafy vegetables, potato, sweet potato, moringa and chilli and their damage symptoms (Potato and Chillies are Solanaceous crops).**(5Hrs.)**
4. Identification of insect pests of mango, cashew, citrus & banana and their damage symptoms. **(5Hrs.)**
5. Identification of insect pests of grapevine, pomegranate, sapota, papaya, apple, custard apple, ber and guava and their damage symptoms. **(5Hrs.)**
6. Identification of insect pests of coconut, arecanut, cocoa, cardamom, pepper, date palm & oil palm, eucalyptus and neem and their damage symptoms. **(5Hrs.)**

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
VI SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time:15hrs/week
AGRD 341(1) **FARM MANAGEMENT & RESOURCE ECONOMICS** Marks:100
SYLLABUS

OBJECTIVES

- To assist farm managers in determining the best use of resources.
- To assist policy makers in determining the consequences of alternative public policies.
- To explain on output, profits and resource use on farms.

COURSE OUTCOMES

CO1: Assist farm managers in determining the best use of resources, given the changing needs, values and goals of the society.

CO2: Explain policy makers in determining the consequences of alternative public policies on output, profits and resource use on farms.

CO3: Evaluate the uses of firm theory for improving farm management and understanding the behaviour of the farm as a profit maximizing entity.

CO4: Evaluate the effects of technical and institutional changes on agricultural production and resource use.

CO5: Create new policies for the management of farm inputs and development of farmers income.

UNIT – I: BASICS OF FARM MANAGEMENT: (2 Hrs.)

1. Meaning and concept of farm management, definitions, objectives and relationship with other sciences - Importance of study of farm management - Farm management problems in India.
2. Meaning and definitions of types and systems of farming and their characteristics - Changing structure of land holdings in India - Characteristics of small, marginal and tenant farm holdings.
3. Concept of production function and its types, use of production function in decision - Making on a farm - Seven principles of farm management.
4. Factor - Product relationship – Law of variable proportions – Definition, graphical and arithmetical explanation with the help of an example.

UNIT – II: THEORIES AND RELATIONS FOR EFFICIENT FARM MANAGEMENT (2 Hrs.)

1. Determination of optimum input and optimum output and decision rules.

2. Factor-Factor relationship, resources and types - Substitutes and complements, variable and fixed resources - Iso-quants - Iso-cost lines-Meaning and characteristics - Principle of least cost combination/ Principle of factor substitution - Explanation and decision rules.
3. Product-Product relationship - Iso- product curves and Iso-revenue lines-Meaning and characteristics - Principle of optimum product combination - Law of equi-marginal returns/ principles of opportunity cost, decision rules.

UNIT – III: FARM BUSINESS MANAGEMENT (2 Hrs.)

1. Types of enterprises and their characteristics - Principle of comparative advantage.
2. Meaning and concept of cost, cost function /cost-output relationship - Types of production costs and their interrelationship - Importance of costs in managing farm business - Minimum loss principle (Cost Principle) and decision rules - Time comparison principle – compounding and discounting.
3. Farm inventory - Meaning and importance of taking inventory on farm business - Different methods of appraisal and valuation of farm resources and products.

UNIT – IV: FARM PLANNING, BUDGETING AND DECISION MAKING (2 Hrs.)

1. Farm planning and budgeting - Meaning and importance, partial budgeting, enterprise budgeting and complete budgeting, steps in farm planning and budgeting.
2. Linear Programming-Meaning - Definition, LP mathematical model specification, importance in farm decision making, basic assumptions, limitations.
3. Concepts of risk and uncertainty in agriculture production, nature and sources of risks and uncertainty and management strategies.

UNIT – V: SUSTAINABILITY, RESOURCE MANAGEMENT AND POLICY IMPLICATIONS (2 Hrs.)

1. Economy and environmental linkages - How economic activity affects life on a planet with limited resources and a fragile environment - Concepts of natural resource economics - Ecological equilibrium, direct use value and indirect use value, willingness to accept and willingness to pay, contingent valuation, opportunity cost, discounting, societal cost - benefit analysis, consumer surplus, carbon sequestration - Unique properties of natural resources.
2. Environmental costs of economic growth - Sustainable development - Positive and negative externalities in agriculture - Inefficiency and welfare loss, solutions.
3. Important issues in economics and management of common property resources of land, water, pasture and forest resources etc. - India’s environmental policy.

Prescribed Textbooks:

1. Bishop, C.E. and W.D. Tousaint. 1958. Introduction to Agricultural Economic Analysis. John Wiley and Sons, London.
2. Heady, Earl O. 1964. Economics of Agricultural Production and Resource Use. Prentice Hall of India, Private Limited, New Delhi
3. S.S. Johl, J.R. Kapur. 2006. Fundamentals of Farm Business Management Kalyani Publishers, New Delhi.
4. Kahlon, A.S. and Karam Singh. 1965. Principles of Farm Business Management. Kalyani Publishers, New Delhi.
5. Raju, V.T. and D.V.S. Rao. 2006. Economics of Farm Production and Management. Oxford & IBH Publishing Co. Pvt. Limited, New Delhi.

Co-curricular Activities: **(5 Hrs.)**

PPT Presentation, weekend tests, Service Learning, Field Activities.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
VI SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT**
Time:30hrs/week
AGRD 341P (1) **FARM MANAGEMENT & RESOURCE ECONOMICS** Marks:50
PRACTICAL SYLLABUS

OBJECTIVES:

- To explain Different methods Computation of depreciation cost of farm assets
- To explain Determination of least cost combination of inputs
- To understand Application of equi-marginal returns

COURSE OUTCOMES:

CO1: Explain communication and nonverbal communication skills.

CO2: Explain verbal communication skills.

CO3: Discuss oral communication skills.

EXPERIMENTS:

1. Different methods: Computation of depreciation cost of farm assets. **(5Hrs.)**
2. Determination of the most profitable level of inputs use and output in farm production process. **(5Hrs.)**
3. Determination of least cost combination of inputs. **(5Hrs.)**
4. Application of equi-marginal returns/opportunity cost principle in allocation of farm resources. **(5Hrs.)**
5. Selection of the most profitable enterprise combination. **(5Hrs.)**
6. Farm holding surveys. **(5Hrs.)**

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR
VI SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT**
Time:15hrs/week

AGRD 372 (1) **DISEASES OF HORTICULTURE CROPS AND THEIR MANAGEMENT**

SYLLABUS Marks:100

OBJECTIVES

4. To study the etiology and symptoms of diseases in horticultural crops
5. To understand the host-parasite relationship in horticultural crops
6. To study the management practices of various diseases for effective crop protection

Course Outcome

At the end of the course, students will be able to

CO1: Understand common horticultural diseases affecting fruits crops like mango, banana and citrus fruits.

CO2: Explain different diseases of horticultural crops like grapevine, apple and peach.

CO3: Understand the diseases of solanaceous crops for effective crop protection.

CO4: Explain the diseases and management practices of crucifers.

CO5: Understand various diseases of flower crops and their management for effective production.

UNIT – I: Diseases and Management Practices of Plantation crops-I (2 Hrs.)

1. Study of etiology, symptoms, host-parasite relationship and specific management practices of the following diseases.
2. Citrus diseases - Citrus canker, gummosis (Phytophthora and Diplodia).
3. Mango diseases: anthracnose, malformation, bacterial leaf spot,powdery mildew. Guava, Papaya, Ber and Sapota diseases – Guava: wilt and anthracnose. Papaya: foot rot and mosaic and powdery mildew. Ber: Powdery mildew. Sapota: Flat limb.

4. Banana and Pomegranate diseases – Banana: Panama wilt, bacterial wilt, Sigatoka,bunchy top, banana mosaic. Pomegranate: Anthracnose and bacterial blight.

UNIT – II: Diseases and Management practices of Plantation crops-II (2 Hrs.)

5. Grapevine diseases – downy mildew, powdery mildew.
6. Apple and Peach diseases –Apple: scab, powdery mildew, fire blight.Peach: leaf curl.
7. Chillies diseases - Damping off, die-back and fruit rot, Fusarium wilt, mosaic complex and leaf curl.

UNIT – III: Diseases and Management practices of Solanaceous crops (2 Hrs.)

1. Brinjal and Okra diseases –Brinjal- Phomopsis blight and fruit rot, bacterial wilt and little leaf. Okra- Cercospora leaf spot, Yellow Vein Mosaic Virus, Powdery mildew.
2. Potato diseases - early and late blight, common scab, wart, leaf roll, mosaics, potato spindle tuber.
3. Tomato diseases - damping off, Ralstonia wilt, early blight, leaf curl, bacterial canker, Tomato spotted wilt and mosaic.

UNIT – IV: Diseases and Management practices of Crucifers (2 Hrs.)

1. Crucifers and Cucurbits diseases – Cruciferous vegetables- Club root, white rust, Downy mildew, powdery mildew. Cucurbits: downy mildew, powdery mildew.
2. Betelvine, onion and garlic diseases –Betelvine: Phytophthora root and stem rot, Fusarium wilt. Onion and garlic: Smudge, smut.
3. Beans, Colocasia and Coriander diseases –Beans- anthracnose, rust, Bean common mosaic virus and bacterial blight. Colocasia: Phytophthora blight, Coriander- stem gall.

UNIT-V: Diseases and Management Practices of Plantation Crops-III (2 Hrs.)

1. Coconut and oil palm diseases –Coconut- Stem bleeding, Ganoderma wilt, bud rot and Tatipaka disease. Oil palm – Bunch rot and spear rot. Tea- blister blight Coffee- rust.

2. Turmeric, ginger and mulberry diseases –Turmeric- leaf spot, leaf blotch. Ginger: rhizome rot/soft rot. Mulberry – powdery mildew.
3. Rose- dieback, powdery mildew and black leaf spot. Marigold: Botrytis blight Chrysanthemum- wilt, stunt. Jasmine- rust. Crossandra – wilt

Prescribed Textbooks:

- Chaube, H.S. and Ramji Singh. 2001. Introductory Plant Pathology. International Book Distribution Co., Lucknow. 136.
- Mehrotra, R.S. 1980. Plant Pathology. Tata McGraw – Hill Publishing Co. Ltd., New Delhi.
- Singh, R.S. 2002. Introduction to Principles of Plant Pathology. Oxford & IBH Publ. Co.P. Ltd., New Delhi.
- Vidyasekharan, P. 1993. Principles of Plant Pathology. CBS Publishers and Distributors, New Delhi.
- Y. L. Nene and P.N. Thaplial, 1993, Fungicides in Plant Disease Control. Oxford and IBH Publishing Co.

Co-curricular Activities: (5 Hrs.)

Field work, Herbarium (Disease leaves collection), Group discussions, Technology based learning, Peer teaching, Field visits.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

VI SEMESTER **B.SC.(HONORS) AGRICULTURE AND RURAL DEVELOPMENT WITH SINGLE MAJOR**

Time:30hrs/week

AGRD 372P (1) **DISEASES OF HORTICULTURE CROPS & THEIR MANAGEMENT PRACTICAL SYLLABUS** Marks:50

OBJECTIVES:

- To study the etiology and symptoms of diseases in horticultural crops
- To understand the host-parasite relationship in horticultural crops
- To study the management practices of various diseases for effective crop protection

Course Outcome

At the end of the course, students will be able to

CO1: Understand common horticultural diseases affecting fruits crops and Solanaceous crops.
CO2: Develop integrated disease management plans for horticultural crops for effective crop protection.

CO3: Demonstrate advanced diagnostic tools, such as molecular diagnostics, immunoassays, and other emerging technologies in plant pathology.

EXPERIMENTS:

Studies of symptoms, identification and histopathological studies of the following

diseases:

1. Citrus and mango diseases. **(5 Hrs.)**

2. Ber, guava and sapota diseases. **(5 Hrs.)**

3. Papaya, banana and pomegranate diseases. **(5 Hrs.)**

4. Chilli, brinjal and okra diseases. **(5 Hrs.)**

5. Potato and tomato diseases **(5 Hrs.)**

6. Field visits for the diagnosis of crop diseases. **(5 Hrs.)**

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

VI SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time:30hrs/week

HORD 390P (1) **PROCESSING OF HORTICULTURE CROPS**

PRACTICAL SYLLABUS Marks:50

OBJECTIVES

O1: To Learn different preservation methods

O2: To Understand traditional and modern processing techniques

O3: To Learn about food safety standards and regulations

COURSE OUTCOMES At the end of the course, students will be able to

CO1: Explain Various methods of processing of fruits and vegetables.

CO2: Demonstrate the various Methods of value added products and its preparation.

CO3: Evaluate the various methods of storage of fruits and vegetables and minimizing the post-harvest losses.

Experiments:

1. Identification of equipment used in processing industry **(5Hrs)**
2. Canning of Fruits and vegetables **(5Hrs)**
3. Preparation of syrups and brines **(5Hrs)**
4. Preparation of Jams and Jellies **(5Hrs)**
5. Preparation of Squash and Candies **(5Hrs)**

6. Preparation of Chutneys and Pickles((Hot and sweet) **(5Hrs)**

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

VI SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time:30hrs/week

HORD 390 (2) **PROCESSING OF HORTICULTURE CROPS** Marks100

SYLLABUS

Objectives

O1: To Learn different preservation methods

O2: To Understand traditional vs. modern processing techniques.

O3: To Learn about food safety standards and regulations

Course outcomes

At the end of the course, students will be able to

CO1: Apply various methods of processing of fruits and vegetables.

CO2: Summarize the various Methods of value-added products and its preparation.

CO3: Demonstrate knowledge of ripening, spoilage, and shelf-life extension methods.

CO4: Explains the losses and causes of the loss to overcome the problem in processing.

CO5: Classify and outline the preparation of essential oils.

UNIT – I: (2Hrs.)

1. Introduction: Importance and scope of fruit and vegetable preservation industry in India. Losses in Post Harvest operations

2. Principles and method of preservation: Preservation by Asepsis, High Temperature, low temperature, chemicals Drying, filtration, carbonation, sugar salt, fermentation, acids, oil and spices, antibiotics, irradiation.

3. 3. Canning and Bottling of fruits and vegetables. Principles and process of canning and bottling. General considerations in Establishing a commercial fruit and vegetable cannery.

UNIT – II: Spoilage of Processed foods (2Hrs.)

4. Causes for spoilage of canned foods a) Spoilage due to physical and chemical changes b) Microbial spoilage c) Discoloration of fruit and canned products

5. Unfermented fruit beverages: Preparation and preservation of unfermented fruit beverages juices, RTS, Nectar, cordial, squash, syrup, fruit juice concentrate, crush. Fermented fruit beverage: Different types of Wines

6. Jams, jellies and Marmalades – Procedure for preparation Jams: Problems of Jam production Jelly: Important considerations in jelly making and problems of jelly preparations. Marmalade: Jelly Marmalade and jam Marmalade.

7. Preservation by sugar: Candies, Crystallized fruits, Preserves procedure for preparation Important considerations and problems in preparations

UNIT – III: Preservation methods (2Hrs.)

8. Preservation by salt: Pickles Procedure for preparation Preservation by vinegar: Problems of pickle making

9. Chutneys and Sauces/ketchups Procedure for preparation Problems in the preparation of sauces and ketchups

10. Tomato processing

UNIT – IV: FPO certification (2Hrs.)

11. Preservation by Freezing. Methods of Freezing Changes during Freezing and Storage of Frozen food

12. Food laws: Fruit Product order Statutory provisions of quality control of India Food Standardization and Regulatory agencies in India.

UNIT – V: Packaging of processed products (2Hrs.)

13. Canning of fruits and vegetables – Selection of fruits and vegetables - Causes of spoilage of canned foods – Testing for defects - Containers for packing of canned products – Tin containers, glass containers.

14. Packaging of products - Definition – Properties of good packaging material – Different packaging materials for fresh fruits and vegetables for export – Cushioning materials – Purpose – Characteristics of cushioning material.

Prescribed Textbooks:

1. Food Preservation & Processing. Kalyani Publishers, India. Vijay, K. 2001. Text Book of Food Sciences and Technology. ICAR, New Delhi. Siddappaa, G. S., Girdhari Lal and Tandon, G.L. 1998.

2. Preservation of Fruits and Vegetables. ICAR, New Delhi FAO - Training Manual No.17/2. 2007. Prevention of post harvest food losses: Fruits, Vegetables and Root crops. Daya Publishing House, Delhi. Morris, T. N. 2006.

3. Post Harvest Technology of Fruits and Vegetables. Vol. I & II. Indus Publishing Co., New Delhi. Verma, L. R.and Joshi, V. K. 2000

4. Fruits and Vegetables Processing- FAO Bulletin 119. International Book Distributing Co., Lucknow. Dauthy, M. E. 1995.

Co-curricular Activities: (5Hrs.)

Presentation, Assignments, Peer teaching, Group Discussion, Quizzes, Field activities.

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ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

VII SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time: 20WEEKS

RAWE 401(20) **Rural Agricultural Work Experience (RAWE) and Agro-Industrial Attachment (AIA)CHANGES** MARKS: 100

SYLLABUS

Objectives

1. To Study the agricultural graduates with clear vision about the rural community.
2. To Learn professional competency and self-confidence among the agricultural graduates to handle the present and emerging demands of agricultural sector.
3. To acquaint students with the various developmental agencies, their approaches and strategies and major programmes of agricultural development.

Course Outcomes

CO1: Summarize on-campus training from various faculties before step into the village attachment and Agro-industrial attachment

CO2: Learn and understand issues related to farming and ruraldevelopment in a natural setting on real-time basis.

CO3: Course provides opportunities for the students to attach with the agri related industries and make them know about the functioning them.

CO4: Students will propose a project based on his interest and concerned specialists will assist them to complete their project.

CO5: The course also provides opportunities for the students to learn about the functioning of the extension organisations viz., state 15 agricultural departments, KVK's, and research stations.

Duration wise activities performed during RAWE

	Activity	Duration
	tation & Placement	2 weeks
	y of Village	15 weeks
	nomical Interventions	
	Protection Interventions	
	mprovement Interventions (Soil sampling and testing)	
	and Vegetable Production Interventions	
	Processing and Storage Interventions	
	al Production Interventions	
	sion and Transfer of Technology Activities	

	Industrial Attachment	2 weeks
	ct Report Preparation, Presentation & Evaluation	1 weeks

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ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

VIII SEMESTER **AGRICULTURE AND RURAL DEVELOPMENT** Time: 20WEEKS

AELP 402 (20) Agriculture Experiential Learning Programme MARKS: 100

SYLLABUS

Objectives

1. To Study professional skills and knowledge through hands on experience
2. To build confidence and ability to work in project mode
3. To acquire enterprise management capabilities.

Course out comes

CO1: Students will produce biocontrol agents like Trichoderma, Pseudomonas and bio-fertilisers like phosphor-bacteria for commercial marketing
CO2: Students will produce hybrid seeds of vegetables for commercial production and marketing.
CO3: Students will analyse soil health and provide management solutions to farmers.
CO4: Student will produce, Mushrooms, honey and vermicompost using their practical knowledge on commercial bee keeping.
CO5: Students will know the different agribusiness opportunities and will get necessary managerial skills

Agricultural Experiential Learning Programme (AELP) This programme will be undertaken by the students preferably during the VIII semester for a total duration of 20 weeks with a weightage of 0+20 credit hours. The students will register for any of two modules (of 0+10 credit hours each) listed below:

1. Production Technology for Bio-agents and Bio-fertilizers
2. Seed Production and Technology
3. Mushroom Cultivation Technology
4. Soil, Plant, Water and Seed Testing
5. Livestock and Poultry Production Technology
6. Hybrid Seed Production Technologies
7. Floriculture and Landscaping

8. Food Processing
9. Commercial Horticulture
10. Agriculture Waste Management
11. Organic Production Technology
12. Commercial Sericulture
13. Agri-business management

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