MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Agriculture & Rural Development **Semester: I**

Course Title: Fundamentals of Agronomy **Course Code: AGRO101**

No. of Hours: 30 Hrs. **Credits: 2**

Objectives:

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

Course Outcomes

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 and 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. Classification of weeds classification based on morphology life cycle habitat origin association – special features and soil pH with examples. 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 - of plants differential rate of absorption - differences in morphology and growth habit 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:

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

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: I**

Course Title: Fundamentals of Agronomy-Practical **Course Code: AGRO101P**

No. of Hours: 30 Hrs. **Credits: 1**

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. **(3 Hrs.)**
2. Practice of puddling: Fields. **(3 Hrs.)**
3. Study of seeding equipment – different methods of sowing: Fields. **(3 Hrs.)**
4. Study of manures, fertilizers and green manure crops / seeds. **(3 Hrs.)**
5. Study of inter-cultivation implements and practice. **(4 Hrs.)**
6. Herbarium preparation of weeds. **(3 Hrs.)**
7. Field tours: Water reservoir: **(10 Hrs.)** 1. Krishna
2. Pattiseema Project (Polavaram)
3. Godavari

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: I**

Course Title: Plant Biochemistry & Soil Science **Course Code: BICM101**

No. of Hours: 30 Hrs. **Credits: 2**

Objectives:

- To identify the building blocks of proteins and their assembly in macromolecules as well as interpret basic enzyme kinetic parameters.
- To explain about the conversion of light energy into chemical energy in photosynthesis.
- To identify Contrast the different mechanisms of carbon fixation in the plant kingdom.

Course Outcomes

CO1: Explain scope and importance of biochemistry in agriculture and structural classification of biomolecules.

CO2: Summarize the properties and mechanism of enzyme activity.

CO3: Outline the metabolism of biomolecules.

CO4: Classify rocks, minerals and soils and explain various aspects of soil and discuss importance of nitrogen, phosphorous and organic soil fertility.

UNIT-I: (6Hrs.)

1. Introduction, Historical aspects of Biochemistry– Scope, impact, and importance of Biochemistry in agriculture.
2. Carbohydrates– Classification - Structures – Monosaccharides – Structural aspects.
3. Oligosaccharides and polysaccharides-Functions of carbohydrates
4. Lipids – Fatty acids – Structures and properties – Functions of lipids.
5. Lipids - Classification – Storage lipids and membrane lipids – Saponification, hydrogenation.
6. Amino acids – Structures - Classification – Zwitterions.

UNIT-II: (6Hrs.)

1. Peptides – Oligopeptides – Cyclic and acyclic peptides.
2. Proteins –Importance Classification - Properties of proteins – Isoelectric pH– Denaturation.
3. Proteins – Structural organization – Primary, secondary, tertiary, and quaternary structures and forces involved in stabilizing proteins.
4. Enzymes – Characteristics of enzymes – Chemical nature, speed, specificity, active

site - activation energy – Mechanism of enzyme action.

5. Measurement of enzyme activity – Factors effecting enzyme activity – Enzyme Inhibition.
6. Classification of enzymes.

UNIT-III: (6Hrs.)

1. Nucleic acids–Functions–Structures of nitrogen bases–Nucleosides– Nucleotidesin RNA and DNA.
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. Metabolism of carbohydrates – Glycolysis – Aerobic and anaerobic.
5. Tricarboxylic Acid (TCA) cycle AND Electron transport chain (ETC)
6. Metabolism of lipids –Biosynthesis of fatty acids and oxidation of fatty acids

UNIT-IV: (6Hrs.)

1. Introduction – evolution of the earth – spheres of the earth atmosphere, hydrosphere and lithosphere – their characteristics
2. 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.
3. Rocks – classification of rocks based on mode of origin- igneous rocks, sedimentary rocks and metamorphic rocks – classification of rocks based on silica content-weatherability of rocks.
4. Minerals-primary, secondary, essential, and accessory minerals- primary minerals – quartz, feldspar, micas, pyroxenes, amphiboles, and olivine's – weatherability of primary minerals.
5. Soil profile – detailed description of a theoretical soil profile – differences between surface soil and sub soil.

UNIT-V: (6Hrs.)

1. Nitrogen fixation, denitrification, solubilization of phosphorus and biological control of plant diseases – promotion of plant growth promoting substances – harmful activities of soil organisms.
2. Soil organic matter – various sources – composition – compounds in plant residues – their decomposability – humus – definition – synthesis of humus.
3. Importance of soil organic matter and humus-fractionation of soil humus-carbon cycle, carbon.
4. Important soil groups of India – alluvial soils, black soils, red soils, laterite soils and coastal sands.

Reference Text Books:

1. Principles of Biochemistry- Lehninger
2. David L. Nelson, Michael M.Cox; W.H. Freeman.Lehninger Principles of Biochemistry, 6th Edition
3. Biochemistry, Dr.U.Satyanarayana, Dr.U. Chakrapani, Books and Allied(P) Ltd, Kolkata

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: I**

Course Title: Plant Biochemistry & Soil Science-Practical **Course Code: BICM101P**

No. of Hours: 30 Hrs. **Credits: 1**

Objectives:

- To identify the building blocks of proteins and their assembly in macromolecules as well as interpret basic enzyme kinetic parameters.
- To Explain the conversion of light energy into chemical energy in photosynthesis
- To Contrast the different mechanisms of carbon fixation in the plant kingdom.

Course Outcomes:

CO1: Describe Biochemistry as a discipline and milestone discoveries in life sciences that led to establishment of biochemistry as a separate discipline.

CO2: Explain about Fundamental properties of elements, their role in formation of biomolecules and in chemical reactions within living organisms.

CO3: Discuss about plant cell structure, organization, and apply specific biochemical functions to compartments of the plant cell and Protein structures.

EXPERIMENTS:

1. Determination of pH and use of pH meter. **(5Hrs.)**
2. Preparation of molar, Normal solutions and Buffers. **(5Hrs.)**
3. Estimation of carbohydrates (glucose) by DNS method. **(5Hrs.)**
4. Estimation of Proteins by Biuret method. **(5Hrs.)**
5. Study types of soil. **(5Hrs.)**
6. Study of sampling collection, processing and storage. **(5Hrs.)**

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: I**

Course Title: Fundamentals of Agricultural Economics **Course Code: AECO141**

No. of Hours: 30 Hrs. **Credits: 2**

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: (6 Hrs.)

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: (6 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
6. Demand schedule – demand curve – Law of demand – contraction and extension, increase and decrease in demand

UNIT-III: (6 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.
6. Price determination – equilibrium price and quantity – determination of market price.
7. Markets – definition – essentials of market – classification of market structure perfect and imperfect markets.

UNIT-IV: (6 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
6. Tax – meaning – classification – direct and indirect taxes – methods of taxation – proportional, progressive, regressive and degressive taxation, agricultural taxation – other types of taxation – Value Added Tax (VAT)
7. Canons of taxation – Adam Smith's canons of taxation – equality, economy, certainty and convenience – other canons of taxation

UNIT-V (6 Hrs.)

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
6. Remedial measures to control inflation – monetary measures – credit control, demonetization of currency and issue of new currency – fiscal measures – reduction in unnecessary expenditure, increase taxes, increase in savings, surplus budgets and public debt.

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.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA 8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: I**

Course Title: Fundamentals of Horticulture **Course Code: HORT181**

No. of Hours: 30 Hrs. **Credits: 2**

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.

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

UNIT-I: (6Hrs.)

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: (6 Hrs.)

Plant propagation methods - sexual asexual and micro propagation. Plant propagation structures – Polyhouses, Net houses, Plastic tunnels and Mist chambers

1. 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: (6 Hrs.)

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: (6 Hrs.)

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

UNIT-V: (6 Hrs.)

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 lanolin paste.
4. Irrigation & fertilizers application – method and quantity

References Text Books:

1. Adams, C.R. and M. P. Early. 2004. Principles of horticulture. Butterworth Heinemam, Oxford University Press.
2. Prasad and Kumar. 2014, Principles of Horticulture Edn (Agri Bios) India
3. Kumar, N.1997. Introduction to Horticulture, Rajalakshmi Publication,Nagercoil.

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: I**

Course Title: Fundamentals of Horticulture-Practical **Course Code: HORT181P**

No. of Hours: 30 Hrs. **Credits: 1**

Objectives:

- To identify garden tools.
- To identify horticultural crops.
- To apply grafting and budding methods.

Course Outcomes:

CO1: Explain plant vegetative structure.

CO2: Describe the basic principles, processes and plant propagation methods.

CO3: Explain propagating plants, manage and harvest a variety of plants.

EXPERIMENTS:

1. Identification of garden tools. **(6 Hrs.)**
2. Identification of horticultural crops. **(6 Hrs.)**
3. Preparation of seed bed / nursery bed. **(6 Hrs.)**
4. Grafting& Budding. **(6 Hrs.)**
5. Transplanting and care of vegetable seedlings. **(6 Hrs.)**

SHEME OF EVALUATION:

S.No.	Experiment	Marks (50)
01	Major Experiment	15Marks
02	Minor Experiment	10Marks
03	Viva	10Marks
04	Record	10Marks
05	Skills	05Marks

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SYLLABUS

Subject: Agriculture & Rural development **Semester: I**

Course Title: Rural Sociology & Educational Psychology **Course Code: AEXT191**

No. of Hours: 30 Hrs. **Credits:2**

Objectives:

- To learn the importance of rural sociology in agricultural extension.
- To learn culture and different cultural concepts in agricultural extension
- To learn personality development and leadership qualities.

Course Outcomes

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

CO2: Outline cultural concepts and social values. Classification and training of leaders.

CO3: Summarize the meaning, scope and importance of educational psychology in agricultural extension.

CO4: Explain meaning, definition and steps of extension teaching and risk benefit analysis and implicates the competence and professional ethics, collegiality and loyalty.

UNIT-I: (6Hrs.)

1. Sociology and rural sociology, extension education, agricultural extension - meaning and Definitions
2. Importance of rural sociology in agricultural extension and their interrelationship
3. Characteristics of Indian, rural society - differences and relationships between rural and urban societies
4. Social group(s) - classification - formation and organization of groups role of social groups in agricultural extension
5. Social stratification - meaning - forms - class system and caste system

UNIT-II: (6Hrs.)

1. Culture and different cultural concepts and their role in agricultural extension
2. Social values, social control and attitudes types and their role in agricultural extension
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. Psychology and educational psychology - meaning - scope and importance

UNIT-III (6Hrs.)

1. Intelligence - meaning - types - factors and importance in agricultural extension
2. Personality - meaning - types - factors and importance in agricultural extension
3. Perception, emotions, and frustration - meaning - types - factors and importance in agricultural extension.
4. Motivation - meaning - types of motives - theories of motivation importance of motivation in agricultural extension
5. Teaching, learning, learning experience and learning situation - meaning and definition - elements of learning situation and its characteristics

UNIT-IV: (6Hrs.)

1. Principles of learning and their implications in teaching - steps in extension teaching
2. Variety of moral issues (part-1): - Understanding the harmony in the society (society being an extension of the family), Integrity, work ethic, Courage, Empathy,Variety of moral issues
3. Self-confidence, Moral Autonomy, Concensensus and Controversy, Professional and Professionalism, Professional idea, and virtues.
4. Principles of Ethics and Morality (part-1): - Ethics as a Subset of Morality, Ethics and Organization, Employee, Duties and Rights.
5. Principles of Ethics and Morality (part 2): Discriminatory and Pre judicial employee practices, Understanding harmony in nature, Natural acceptance of human values.
6. Risk benefit analysis (part-1): - Reducing risk, the government regulators, approach to risk, handling ethical dilemmas at work.

UNIT-V: (6Hrs)

1. Risk benefit analysis (part-2): - Market strategy and ethics, ethical practice in marketplace, ethics in finance, ethics in business and environment.
2. Collegiality and loyalty (part-1): Respect of authority, collective bargaining, confidentiality, professional rights.
3. Collegiality and loyalty (part-2): -Intellectual property rights, multinational corporation and ethical investing, computer and ethics, management patterns
4. Competence and professional ethics: -

   I. Ability to utilize the professional competence and augmenting universal human

order

II. Ability to identify the scope and characteristic people friendly and eco-friendly production

III. Ability to identify and develop appropriate technologies and management and pattern for above production system

5. Strategy for transition from the present state to universal human order

I. At the level of individual- as socially and ecologically responsible technologies and managers

II. At the level of society- as mutually enriching institutions and organizations 6. Case studies of typical holistic technologies and management patterns.

References Text Books:

1. Adivi Reddy, A. 2001. Extension Education. Sri Lakshmi Press, Bapatla.
2. Chitamber, J.B. 1997. Introductory Rural Sociology. Wiley Eastern Limited, New Delhi.
3. Daivadeenam, P. 2002. Educational Psychology in Agriculture. Agrotech Publishing Academy, Udaipur.
4. Mangal, S.K. 2000. Educational Psychology. Prakash Brothers, Ludhiana.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA 8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: II**

Course Title: Agro Meteorology & Climate Change **Course Code: AGRO103**

No. of Hours: 30 Hrs. **Credits: 2**

Objectives:

- To study about climatic resources of a given area for effective crop planning
- To study crop weather relationship
- To understand roles of agrometeorology in agriculture

Course Outcomes

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.

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

UNIT-V: (6Hrs.)

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. 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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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: II**

Course Title: Agrometeorology & Climate Change-Practical **Course Code: AGRO103P**

No. of Hours: 30 Hrs. **Credits: 1**

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

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA, 8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Agriculture & Rural Development **Semester: II**

Course Title: Fundamentals of Genetics **Course Code: GPBR111**

No. of Hours: 30 Hrs. **Credits: 2**

Objectives:

- To learn and apply concepts of modern transmission and molecular genetics.
- To study the purpose of the cell cycle
- To study about the mendals laws

Course Outcomes

CO1: Discuss details of cell cycle and structures of cell organelles.

CO2: Explain heredity and laws of inheritance in genetics.

CO3: Compare gene interactions, recessive and dominant traits.

CO4: Outline the concepts of karyotype, sex linkage and mutations and central dogma of genetic material and genetic code.

UNIT-I: (6 Hrs.)

1. Pre Mendelian concepts of heredity – Early history of heredity, inheritance of acquired traits, preformation theory, pangenesis and germplasm theory.
2. Chromosome - Structure of chromosome, types of chromosomes based on position of centromere.
3. Cell division – Cell cycle – Mitosis - Process of mitosis - Significance.
4. Meiosis - Process - Differences between mitosis and meiosis - Significance.
5. Mendelian principles of heredity -Terminology, Mendel's Experiments-Reasons for selection of pea as experimental material characters studied - Reasons for mendel's success.
6. 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.

UNIT-II: (6 Hrs.)

1. Gene interaction - Nonepistatic interaction – Interaction of factors; epistatic interactions - Complementary epistasis, dominant epistasis.
2. Recessive epistasis, duplicate dominant gene action, dominant suppression or inhibitory gene action, duplicate genes with cumulative effect.
3. Multiple alleles – Characteristics of multiple alleles - Blood groups in humans, coat colour in rabbits, self-incompatibility alleles in plants - pleiotropism, penetrance and expressivity.

4. Linkage – Definition – Classification of linkage – Characteristic features of linkage. Linkage groups.
5. Detection of linkage – Estimation of linkage - Importance of test cross in linkage studies significance in plant breeding.

UNIT-III: (6 Hrs.)

1. Chromosome mapping – point
2. Point test cross – Cytological maps and genetical maps
3. Coincidence and interference.
4. Sex determination - Various mechanisms of sex determination Chromosomal sex determination, genic balance mechanism of s ex determination in Drosophila melanogaster, male haploidy, single gene effects etc.
5. 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.
6. Qualitative and Quantitative traits, Polygenes and continuous variations - Definition - Inheritance and their differences, multiple factor hypothesis.

UNIT-IV: (6 Hrs.)

1. Nature and structure of genetic material - DNA and its structure - Watson and Crick's model - Function – Experiments to prove DNA as genetic material.
2. Replication of DNA-Modes of DNA replication - Semi-conservative DNA replication Experimental proof.
3. Types of RNA - Messenger RNA, ribosomal RNA and transfer RNA - structure of tRNA, differences between DNA and RNA.
4. Transcription and translational mechanism of genetic material - Genetic code – Properties of genetic code – Wobble hypothesis.

UNIT-V: (6 Hrs.)

1. 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.
2. Methods of inducing mutations, Physical and chemical mutagens - Detection of sex linked lethals in Drosophila (CIB method given by Muller).
3. Molecular basis of mutations - Transitions, transversions and frame shift mutations Importance of mutations in plant breeding.

References Text Books:

1. Pundhan Singh. 2006. Genetics. Kalyani Publishers, Ludhiana.
2. Singh, B.D. 2015. Fundamentals of Genetics. Kalyani Publishers, Ludhiana. 3. Gupta, P.K.2007. Genetics. Rastogi Publications, Me erut. 4. Khanna, V.K. 2002. Genetics Numerical Problems. Kalyani publishers. 2nd edition

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: II**

Course Title: Fundamentals of Genetics-Practical **Course Code: GPBR111P**

No. of Hours: 30 Hrs. **Credits:1**

Objectives:

- To learn and apply concepts of modern transmission and molecular genetics.
- To study the purpose of the cell cycle.
- To study about the mendals laws.

Course Outcomes:

CO1: Explain about Pre Mendelian concepts of heredity.

CO2: Summarize the Chromosome - Structure of chromosome, types of chromosomes.

CO3: Explain about Linkage and cell cycles

EXPERIMENTS:

1. Study of microscope. **(3Hrs.)**
2. Study of cell structure. **(3Hrs.)**
3. Practice on meiotic cell division. **(4Hrs.)**
4. Monohybrid and its modifications, Dihybrid and Trihybrid. **(4Hrs.)**
5. Test cross and back cross. **(4 Hrs.)**
6. Epistatic interactions including test cross and back cross. **(4Hrs.)**
7. Study of models on DNA and RNA structure. **(4Hrs.)**
8. Epistatic interactions including test cross and back cross. **(4Hrs.)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA 8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Agriculture & Rural Development **Semester: II**

Course Title: Fundamentals of Entomology- I **Course Code: ENTO131**

No. of Hours: 30 Hrs. **Credits: 2**

Objectives:

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

Course Outcomes

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: (6 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: (6 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: (6 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: (6 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 presentday insects with special emphasis to orders and families of agricultural importance like Arthoptera: Acrididae, Tettigonidae, Gryllidae, Gryllotalpidae

UNIT-V: (6 Hrs.)

1. 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.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: II**

Course Title: Fundamentals of Entomology- I - Practical **Course Code: ENTO131P**

No. of Hours: 30 Hrs. **Credits: 1**

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 ins ects including immature stages; External features of Grasshopper/Blister beetle. **(7 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). **(8 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.)**

MARIS STELLA COLLEGE (AUTONOMOUS) VIJAYAWADA 8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: II**

Course Title: Soil & Water Conservation Engineering **Course Code: AENG151**

No. of Hours: 30 Hrs. **Credits: 2**

Objectives:

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

Course Outcomes

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: (6Hrs.)

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: (6Hrs.)

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: (6Hrs.)

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: (6Hrs.)

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: (6Hrs.)

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.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development | **Semester: II**

Course Title: Soil & Water Conservation Engineering-Practical | **Course Code: AENG151P**

No. of Hours: 30 Hrs. | **Credits: 1**

Objectives:

- To study about natural resources management for sustainable agriculture
- To study about management of land and water
- 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. **(4 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. **(3 hrs.)**
4. Levelling concepts and practical utility in agriculture. **(4 hrs.)**
5. Water discharge measurements lab exercises for computing discharge. **(3 hrs.)**
6. Different irrigation pumps and their constructional differences. **(3 hrs.)**
7. Farm Pond construction and its design aspects. **(3 hrs.)**
8. Farm Pond and canal lining and its procedures. **(3 hrs.)**
9. Visit to nearby farm pond. **(3 hrs.)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA 8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Agriculture & Rural Development **Semester: II**

Course Title: Fundamentals of Plant Pathology-I **Course Code: PATH171**

No. of Hours: 30Hrs **Credits: 2**

Objectives:

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

Course Outcome

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 and 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. Types of fungal thalli, fungal tissues
2. 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 Hr.)

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.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: II**

Course Title: Fundamentals of Plant Pathology-I-Practical **Course Code: PATH171P**

No. of Hours: 30 Hrs. **Credits: 1**

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. **(3 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. **(3 Hrs.)**
5. Study of imperfect fungi – Aspergillus, Penicillium and Pyricularia. **(3 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.)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Agriculture & Rural Development **Semester: III**

Course Title: Crop Production Technology – I **Course Code: AGRO201**

No. of hrs: 30 **Credits: 2**

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 11. Wheat- Origin - geographical distribution - area, production and productivity in India and Andhra Pradesh - economic importance - soil and climatic requirements - zones of wheat cultivation - growth Stages - Classification

5. Land Preparation - seeds and sowing - nutrient management - water management - weed management - climate resilient technologies
6. Harvesting -yield attributes – yield - post harvest operations – wheat based cropping systems – value addition

UNIT III (6hrs)

1. Barley – Origin- geographical distribution - economic importance- classification - area, production and productivity in India and Andhra Pradesh - soil and climatic requirements — varieties - cultural practices - Harvesting -Yield attributes – yield

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

3. Land Preparation – zero tillage - seeds and sowing - nutrient management - water management - weed management - climate resilient technologies21

4. Harvesting - yield attributes – yield - post harvest operations - value addition - cropping systems 18. Millets- Economic importance - constraints and strategies for increasing the production of millets - climate resilient technologies

5. Jowar- Origin - geographical distribution - economic importance - area, production and productivity in India and Andhra Pradesh - soil and climatic requirements - zones of jowar cultivation - growth Stages - Land Preparation - seeds and sowing.

UNIT IV (6hrs)

1. Nutrient management - water management - weed management – harvesting- yield attributes – yield - post harvest operations - value addition- sorghum effect, mid-season corrections - cropping systems
2. Pearl millet – Origin - geographical distribution - economic importance - area, production and productivity in India and Andhra Pradesh- soil and climatic requirements -growth Stages - land preparation - seeds and sowing - Nutrient management - sater management - weed management – harvesting- yield attributes – yield - post harvest operations - value addition - cropping systems
3. Finger millet- Origin - geographical distribution - economic importance - area, production and productivity in India and Andhra Pradesh- soil and climatic requirements, growth Stages - land preparation, seeds and sowing - nutrient management - water management - weed management – harvesting - yield attributes – yield - post harvest operations - value addition - cropping systems
4. Proso millet, Little millet and Kodo millet – Origin - geographical distribution - economic

importance - adaptations, soil and climatic requirements - growth Stages - land preparation - seeds and sowing - nutrient management - water management - weed management – harvesting - yield attributes – yield - post harvest operations

5. Foxtail millet, Barnyard millet- Origin - geographical distribution- economic importance – Adaptations - soil and climatic requirements - growth Stages- land preparation- seeds and sowing- nutrient management - water management - weed management- harvesting - yield attributes – yield - post harvest operations
6. Pulses- Economic importance - constraints for achieving higher productivity of pulses, strategies for improving the pulse production in India - climate resilient technologies
7. Pigeonpea- Origin - geographical distribution - economic importance- area, production and productivity in India and Andhra Pradesh - soil and climatic requirements - growth Stages - land Preparation - seeds and sowing – varieties - nutrient management - water management - weed management – harvesting- yield attributes – yield - post harvest operations - cropping systems .

UNIT V (6hrs)

1. Greengram – Origin - geographical distribution - economic importance - area, production and productivity in India and Andhra Pradesh - soil and climatic requirements growth stages - land Preparation- seeds and sowing – varieties nutrient management -water management weed management- harvesting- yield attributes – yield - post harvest operations - cropping systems

2. Blackgram – Origin- geographical distribution, - economic importance - area, production and productivity in India and Andhra Pradesh - soil and climatic requirements - growth stages - land Preparation - seeds and sowing – varieties- nutrient management - water management weed management - harvesting- yield attributes – yield - post harvest operations - cropping systems

3. Bengalgram - Origin - geographical distribution- economic importance- area, production and productivity in India and Andhra Pradesh - soil and climatic requirements- growth stages -types of chick pea -land preparation - seeds and sowing- varieties- nutrient management water management- weed management- harvesting- yield attributes – yield - post harvest operations - cropping systems

4. Lentil, peas- Origin- geographical distribution - economic importance- area, production and productivity in India and Andhra Pradesh - soil and climatic requirements- growth stages-types of lentil and peas - land Preparation - seeds and sowing – varieties- nutrient management- water management- weed management-harvesting- yield attributes – yield - post harvest operations - cropping systems

5. Horsegram- Origin- geographical distribution - economic importance - area, production and productivity in India and Andhra Pradesh - soil and climatic requirements- growth stages - land Preparation- seeds and sowing – varieties-nutrient management- water management weed management- harvesting- yield attributes – yield - post harvest operations - cropping systems

6. Cowpea- Origin - geographical distribution- economic importance - area, production and productivity in India and Andhra Pradesh - soil and climatic requirements - growth Stages - land preparation-seeds and sowing- varieties - nutrient management- water management weed management-harvesting- yield attributes – yield - post harvest operations - cropping systems

References Text books

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

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture and Rural Development **Semester: III**

Course Title: Crop Production Technology -I - Practical **Course Code: AGRO201P**

No. of Hrs:30 **Credits:1**

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)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Developments **Semester: III**

Course Title: Economics for Rural Development **Course Code: AERD201**

No. of Hrs: 30 **Credits: 2**

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, Inter-disciplinary 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

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

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: III**

Course Title: Fundamentals of Plant Breeding **Course Code: GPBR211**

No. of Hrs:30 **Credits: 2**

Objectives

- To study Genetics in relation to plant breeding.
- To study identifying the characteristics of self- and cross-pollinated crops
- To study about determine breeding methodology for plants.

Course Outcome

CO1: Explain historical development, concepts, nature and role of plant breeding and modes of reproduction.

CO2: Discuss plant introduction and centres of origin/diversity.

CO3: List and explain the different plant breeding methods.

CO4: Summarize the development of resistance and tolerance mechanisms.

UNIT I (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. Modes of reproduction and apomixis - Asexual reproduction (vegetative reproduction and apomixis) and sexual reproduction - Their classification and significance in plant breeding.
3. Modes of pollination - Classification of crop species on the basis of mode of pollination– 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 - Classification – Heteromorphic, homomorphic, gametophytic and sporophytic systems of incompatibility – Advantages and disadvantages – Utilization in crop improvement.
5. Male sterility- 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.

6. Domestication, acclimatization and introduction - Plant introduction – Primary introduction and secondary introduction – Plant introduction agencies in India – National Bureau of Plant Genetic Resources (NBPGR) and its activities – Procedure of plant introduction – Merits and demerits of plant introduction.
7. Centre of origin/diversity - Centres of diversity– Centres of origin – Classification – 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.

UNIT II (6hrs)

1. Breeding methods in self-pollinated crops - Modes of selection - Selection – Natural and artificial selection – Basic principles of selection – Basic characteristics and requirements of selection – Selection intensity – Selection differential, heritability (narrow and broad sense) – Genetic advance as per cent of mean.
2. Mass selection – Procedure for evolving a variety by mass selection – Modification of mass selection – Merits, demerits and achievements.
3. 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.
4. Hybridization techniques - Hybridization – Aims and objectives – Types of hybridization – Pre-requisites for hybridization – Procedure / steps involved in hybridization.
5. Handling of segregating population - Pedigree method – Procedure – Merits, demerits and achievements. 13 Bulk method – Procedure – Merits, demerits and achievements – Comparison between pedigree and bulk methods - Single seed descent method – Merits and demerits.

UNIT III (6hrs)

1. 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.
2. Multiline concept - Definition – Characteristics of a good multiline – Development of multiline varieties – Achievements.
3. Concepts of population genetics and Hardy - Weinberg Law - 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.

4. Recurrent selection – Different types – Detailed procedure of simple recurrent selection and other recurrent selection methods – Conclusion on the efficiency of different selection schemes.
5. Heterosis - Heterosis and hybrid vigour – Luxuriance – Heterobeltiosis – Brief history– heterosis in cross pollinated and self-pollinated species – Manifestations of heterosis
6. Genetic basis of heterosis – Dominance, over dominance and epistasis hypotheses – Objections and their explanations – Comparison between dominance and overdominance hypotheses – Physiological basis of heterosis.

UNIT IV (6hrs)

1. Inbreeding depression - Brief history – Effects of inbreeding – Eegrees of inbreeding depression – Procedure for development of inbred lines and their evaluation.
2. Development of inbred lines and hybrids - Exploitation of heterosis – History of hybrid varieties – Important steps in production of single and double cross hybrids – Brief idea of hybrids in maize, pearl millet, sunflower and rice.
3. Composite and synthetic varieties - Production procedures – Merits, demerits and achievements – Factors determining the performance of synthetic varieties – Comparison between synthetics and composites.
4. Breeding methods in asexually propagated crops, clonal selection and hybridization - Characteristics of asexually propagated crops – Characteristics of clones –Clonal selection – Procedure – Advantages and disadvantages – Problems in breeding asexually propagated crops – Genetic variation within a clone – Clonal degeneration – Achievements – Comparison among clones, purelines and inbreds - Breeding of annual asexually propagated species through hybridization – Interspecific hybridization.
5. Wide hybridization and pre-breeding - History – Objectives – Barriers for the production of distant hybrids– Techniques for production of distant hybrids – applications of wide hybridization in crop improvement – Sterility in distant hybrids – Limitations and achievements -use of gene pools to develop intermediate breeding material.
6. Polyploidy in relation to plant 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.
7. 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.
2. Insect resistance – Mechanism of insect resistance in plants (non preference, antibiosis, tolerance and avoidance) – Nature of insect resistance – Genetics of insect resistance – Horizontal and vertical resistance– Sources of insect resistance – breeding methods for insect resistance – Problems in breeding for insect resistance – Achievements.
3. Drought resistance – Mechanisms of drought resistance (drought escape, avoidance, tolerance, and resistance) – Features associated with drought resistance – Sources of drought resistance – Breeding methods for drought resistance – Limitations – achievements - Resistance to water logging – Effects of water logging - Mechanism of tolerance – Ideotype for flooded areas.
4. 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.
5. Biotechnological tools - DNA markers and marker assisted selection - Definition and classification of DNA markers and applications.
6. Participatory plant breeding - Definition – Goals – Methodology – Advantages and limitations.

References text books

1. 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.
2. Poehlman, J.M. and Borthakur, D. 1995. Breeding of Asian Field Crops. Oxford and IBH Publishing Co., New Delhi.
3. Sharma, J.R. 1994. Principles and Practice of Plant Breeding.Tata McGraw Hill, Publishing Company Ltd., New Delhi. GPBR 311 CROP IMPRO

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: III**

Course Title: Fundamentals of Plant Breeding-Practical **Course Code: GPBR211P**

No. of Hrs:30 **Credits:1**

Objectives:

· To study Genetics in relation to plant breeding.

· To study about identifying the characteristics of self- and cross-pollinated crops

· To study about determining breeding methodology for plants.

Course Outcomes:

CO1: Explain about Historical developments, concept, nature and role of plant breeding

CO2: Explain about Modes of reproduction and apomixes, Asexual reproduction (vegetative reproduction and apomixis) and sexual reproduction

CO3: Outline about Modes of pollination, Classification of crop species and Hybridization techniques

EXPERIMENTS:

1. Plant Breeder's kit. **(3hrs)**
2. Study of germplasm of various crops. **(3hrs)**
3. Emasculation and hybridization techniques in self-pollinated crops – rice, groundnut. **(4hrs)**
4. Emasculation and hybridization techniques in self-pollinated crops – greengram, sesame. **(4hrs)**
5. Emasculation and hybridization techniques in cross pollinated crops – maize, castor. **(4hrs)**
6. Emasculation and hybridization techniques in often cross-pollinated crops – cotton, redgram. **(4hrs)**
7. Consequences of inbreeding on genetic structure of resulting populations. **(4hrs)**
8. Study of male sterility systems. **(4hrs)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Developments **Semester: III**

Course Title: Fundamentals of Entomology- II **Course Code: ENTO231**

No. of Hrs: 15 **Credits: 1**

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.
2. 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.

3. 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

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Developments **Semester: III**

Course Title: Fundamentals of Entomology II-Practical **Course Code: ENTO231P**

No. of Hrs:30 **Credits:1**

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)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: III**

Course Title: Agricultural Finance & Co-operation **Course Code: AECO241**

No. of Hrs: 15 **Credits: 1**

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)

1. 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

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

(Affiliated to Krishna University, Machilipatnam)

PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: III**

Course Title: Agricultural Finance & Co-Operation-Practical **Course Code: AECO241P**

No. of Hrs:30 **Credits:1**

Objectives:

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

Course Outcomes:

CO1: Understand definitions of agricultural finance and meaning and significance of micro and macro finance.

CO2: Explains Credit analysis and World Bank (WB) - Objectives and functions

CO3: Learn Social control and functions of RRBs in Andhra Pradesh.

EXPERIMENTS:

1. Estimation of credit requirement of farm business – A case study. **(4hrs)**
2. Estimation of scale of finance - Unit costs and KCC. **(4hrs)**
3. Determination of most profitable level of capital use. **(3hrs)**
4. Analysis of progress and performance of priority sector lending by commercial banks, Cooperatives, RRBs and non-institutional sources using published data. Working out different repayment plans with examples. **(4hrs)**
5. Lump sum repayment /straight-end repayment, Variable or quasi variable repayment. **(3hr)**
6. Amortized decreasing repayment plan and amortized even repayment plan. **(4hrs)**
7. Estimation of indemnity for crop insurance claims. **(3hrs)**
8. Visit and study of a commercial bank to acquire first-hand knowledge of their management, schemes and procedures of lending and sanction of loans. **(4hrs)**
9. Visit and study of a cooperative bank - PACS/ DCCB to acquire first-hand knowledge of their management, schemes and procedures of lending and sanction of loans. **(4hrs)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development | **Semester: III**

Course Title: Farm Machinery & Power | **Course Code: AENG251**

No. of Hrs: 15 | **Credits: 1**

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.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: III**

Course Title: Farm Machinery & Power-Practical **Course Code: AENG251P**

No. of Hrs:30 **Credits:1**

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)**
8. Familiarization with seed metering mechanism and its calibration. **(3hrs)** 9. Study on planters and transplanters. **(3hrs)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Agriculture and Rural Development **Semester: III**

Course Title: Eco-Physiology **Course Code: CPHY261**

No. of Hrs: 15 **Credits: 1**

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

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

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: III**

Course Title: Eco-Physiology-Practical **Course Code: CPHY261P**

No. of Hrs:30 **Credits:1**

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.

EXPERIMETS:

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. Measurement of microclimate in contrast crop canopies **(3hrs)**
8. Effect of dust pollution on crop growth **(3hrs)**
9. Effect of soil pollution on crop growth **(3hrs)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: III**

Course Title: Fundamentals of Plant Pathology-II **Course Code: PATH271**

No. of Hrs:15 **Credits: 1**

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

1. Agrios, G.N. 2005.Plant Pathology. Elsevier Academic Press, New York.
2. Chaube, H.S. and Ramji Singh. 2001. Introductory Plant Pathology. International Book Distribution Co., Lucknow. 136
3. Mehrotra, R.S. 1980. Plant Pathology. Tata McGraw-Hill Publishing Co. Ltd., New Delhi.
4. Singh, R.S. 2002. Introduction to Principles of Plant Pathology. Oxford & IBH Publ. Co.Pvt. Ltd., New Delhi.
5. Vidyasekharan, P. 1993. Principles of Plant Pathology. CBS Publishers and Distributors,New Delhi.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: III**

Course Title: Fundamentals of Plant Pathology-II-Practical **Course Code: PATH271P**

No. of Hrs:30 **Credits:1**

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)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture and Rural Development **Semester: III**

Course Title: Production Technology for Vegetables & Spices **Course Code: HORT281**

No. of Hrs:15 **Credits: 1**

Objectives:

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

Course Outcomes

CO1: Classify and explain the importance of vegetables and spices in human nutrition and national economy.

CO2: Outline the agronomical practices for vegetables, fruits and spices.

CO3: Summarize physiological disorders of vegetables, fruits and spices

CO4: Explain disease and pest control and in vegetables, fruits and spices and seed production techniques.

UNIT I (4hrs)

1. Importance of vegetables and spices 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.
4. Okra and Leafy vegetables (Amaranthus and Gogu) - 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.

UNIT II (3hrs)

1. Cucurbits – Flowering, sex expression, sex ratio - Cucumber, 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.
2. 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 – Production of seedless watermelons - Storage - Physiological disorders - Disease and pest control and seed production.
3. 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 III (3hrs)

1. Peas and beans (Cluster bean, 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.
3. Tapioca and Sweet potato - 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 (3hrs)

1. Perennial vegetables – Drumstick and Curry Leaf- 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. 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.
3. 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.

UNIT V (2hrs)

1. 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.
2. 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.
3. Cinnamon - Coriander and Fenugreek- 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

1. Pranab Hazra, A. Chattopadhyay, K. Karmakar and S. Dutta. 2010. Modern Technology in Vegetable 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 Som M. G., 2002. Vegetable Crops Vol. II & III Naya Prokash, Kolkata. 6. Shanmugavelu, K.G., N. Kumar and K.V. Peter 2005. Production Technology of Spices and Plantation Crops. Agrobios (India), Jodhpur.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: III**

Course Title: Production Technology for Vegetables & Spices- Practical **Course Code: HORT281P**

No. of Hrs:30 **Credits:1**

Objectives:

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

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 man agement, Harvesting, Yield, Storage

EXPERIMENTS:

1. Identification of vegetables and their seeds. **(3hrs)**
2. Identification of spices crops and their seeds. **(3hrs)**
3. Nursery raising techniques of vegetable crops. **(3hrs)**
4. Direct seed sowing and transplanting. **(3hrs)**
5. Study of morphological characters of different vegetables. **(3hrs)**
6. Study of morphological characters of different spices. **(3hrs)**
7. Physiological disorders of vegetable crops. **(3hrs)**
8. Intercultural operations in vegetable crops. **(3hrs)**
9. Fertilizers application methods. **(3hrs)**
10. Seed extraction methods in vegetables. **(3hrs)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: III**

Course Title: Fundamentals of Agricultural Extension **Course Code: AEXT291**

No. of Hrs: 30 **Credits: 2**

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 and learn about Farmers' Training Centre (FTC).

Course Outcomes

CO1: Explain the concepts and development of different types of extension education.

CO2: List and explain agriculture extension development programmes of GoI and new trends in agricultural extension.

CO3: Summarize different systems and schemes for community and rural development.

CO4: Examine programmes for social justice, women development and explain training in rural leadership, extension administration and also for professional qualification and communication models

UNIT I (6Hrs)

1. Education - Meaning, definition and Types – Formal, non-formal and informal education. Extension Education – Meaning, definition, concepts - Characteristics, scope and process.
2. Objectives and principles of extension education.
3. Extension programme planning – Meaning, process, principles.
4. 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 / Govt. of India, KVK, ORP and ND.
   b) IVLP.
5. a) Extension / Agriculture development programmes launched by ICAR / Govt. of India – NATP, ATMA, SREP, ATIC.
   b) NAIP.
6. 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 principles - Philology of C.D.
3. Rural development - Meaning, definitions, concept, characteristics, objectives, importance and problems in rural 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 – observability and predictability.
6. Innovation – Decision process – Meaning – Stages (Knowledge, persuasion, decision, implementation and confirmation) - 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

1. Adivi Reddy, A. 2006. Extension Eduation. Sree Lakshmi Press, Bapatla.
2. Dahama, O.P. and Bhatnagar, O.P. 1999. Extension and Communication for Development. Oxford & IBH Private Limited, New Delhi/Mumbai.
3. Ganesh, R., Mohammad Iqbal and Ananda Raja. 2003. Reaching the Unreached – Basics of Extension Education. Associate Publishing Company, New Delhi.
4. Jalihal, K.A. and Veerabhadraiah, V. 2007. Fundamentals of Extension Education and Management in Extension. Concept Publishing House, New Delhi.
5. Ray, G.L. 2006. Extension Communication and Management. Naya Prokash/Kalyani Publishers, Kalkatta/Ludhiana.
6. Rayudu, C.S. 1997. Communication. Himalaya Publishing House, New Delhi.

Rogers, E.M. 2003. Diffusion of Innovation. Free Press, New Delhi.

7. Soma Sundaram, T. 1977. Producing Agricultural Information Materials. Kansas State University, USA and APAU, Hyderabad.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: III**

Course Title: Fundamentals of Agricultural Extension-Practical **Course Code: AEXT291P**

No. of Hrs:30 **Credits:1**

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 learn about Farmers' Training Centre (FTC).

Course Outcomes:

CO1: Explain about Education, Meaning, definition and Types

CO2: Explain about Objectives and principles of extension education.

CO3: Outline and understand Extension efforts in pre-independence era and Extension / Agriculture development programmes.

EXPERIMENTS:

1. Audio-visual aids – Meaning, importance and classification - Selection, planning, preparation, evaluation, presentation and use of audio-visual aids – Charts. **(3hrs)**
2. Selection, planning, preparation, evaluation, presentation and use of audio-visual aids – Charts, posters, flip charts, flash cards, plannel graphs. **(3 hrs)**
3. Selection, planning, preparation, evaluation, presentation and use of audio-visual aids – Power point slides. **(3hrs)**
4. Planning and preparation of extension literature – Leaflet, folder, pamphlet, booklet, news stories and success stories. **(3hrs)**
5. Handling and use of audio visual equipments such as public address equipment (PAE) system and still camera and digital camera and Liquid Crystal Display (LCD) Projector.
6. Group discussion – Simulated exercise **(3hrs)**
7. Visit to KVK. **(3hrs)**
8. Visit to Farmers' Training Centre (FTC). **(3hrs)**
9. Visit to District Agricultural Advisory and Transfer of Technology Centre (DAATTC). **(3hrs)**

10. Visit to study organization and functioning of DRDA, DWMA, ATMA, JDA Office and other development departments at district level.
11. Visit to a village to exercise PRA techniques **(3hrs)**

SCHEME OF EVALUATION:

S. No.	Experiment	Marks (50)
01	Major Experiment	15Marks
02	Minor Experiment	10Marks
03	Viva	10Marks
04	Record	10Marks
05	Skills	05Marks

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: IV**

Course Title: Crop Production Technology–II **Course Code: AGRO202**

No. of Hrs:30 **Credits: 2**

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:

1. Reddy, S.R. and Reddi Ramu. 5th edition, 2016. Agronomy of field crops. Kalyani publishers, Ludhiana.
2. Chidda Singh, Singh, P and Singh, R. 2003. Modern techniques of raising field crops.

Oxford & IBH Publishing house, New Delhi.

3. Rajendra Prasad. 2004. Text book of field crops production. Commercial crops, volume-II, Technical Editor, ICAR, New Delhi.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: IV**

Course Title: Crop Production Technology–II- Practical **Course Code: AGRO202P**

No. of Hrs:30 **Credits:1**

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 **(3hrs)**
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. **(3hrs)**

9. Visit to nearby farmers' fields **(3hrs)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Agriculture & Rural Development | **Semester: IV**

Course Title: Irrigation, Water Management & Farming Systems | **Course Code: AGRO203**

No. of Hrs: 30 | **Credits: 2**

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 - 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

1. Michael, A.M. 2006. Irrigation – Theory and Practice. Vikas Publishing House Pvt. Ltd., New Delhi. Reddy, S.R. 2016.
2. Arun K. Sharma. 2006. A hand book of organic farming - Agrobios (India) Jodhpu
3. Jayanthi C, Devasenapathy P and Vinnila, C. 2008. Farming systems principles and

practice. Satish serial publishing house, Delhi

4. Panda.S.C. 2011. Cropping and farming systems. Agrobios (India) Jodhpur. Ruthenburg, H. 1980. Farming systems in the tropics. Oxford university.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

(Affiliated to Krishna University, Machilipatnam)

PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: IV**

Course Title: Irrigation, Water Management & Farming Systems-Practical **Course Code: AGRO203P**

No. of Hrs: 30 **Credits:1**

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)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: IV**

Course Title: Agricultural Marketing, Trade & Prices **Course Code: AECO242**

No. of Hrs:30 **Credits: 2**

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

1. S S Acharya and N L Agarwal. 2012. Agricultural Marketing in India. Oxford & IBH Publications Co. Pvt. Ltd., New Delhi.
2. S S Acharya and N L Agarwal. Agricultural Price: Analysis and Policy. Oxford & IBH Publications Co. Pvt Ltd., New Delhi.
3. 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,
4. Kahlon, A.S and Tyagi.D S. 1983. Agricultural Price Policy in India. Allied Publishers Pvt. Ltd., New Delhi.
5. Mamoria, C.B. and Joshi. R L.1995. Principles and Practices of Marketing in India. Kitab Mahal, Allahabad
6. Philip Kotler, Kevin Lane Keller, Abraham Koshy and Mithileswar Jha. 2009. Marketing Management: A South Asian Perspective. International 13th edition. Pearson Prentice Hall

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development | **Semester: IV**

Course Title: Agricultural Marketing, Trade & Prices - Practical | **Course Code: AECO242P**

No. of Hrs:30 | **Credits:1**

Objectives:

- To Calculate elasticities for important agricultural commodities.
- To Study about relationship between market arrivals and prices of some selected commodities.
- To Computation of marketable and marketed surplus of important commodities.

Course Outcomes:

CO1: Learn Demand and supply of agri-commodities, factors affecting the demand and supply of farm products

CO2: Understand Marketing process and functions

CO3: Understand Packing and packaging, branding, grading, standardization, FAQs major crop produce, quality control and labelling - AGMARK, HACCP FSSAI, CODEX and 4Ps of marketing

EXPERIMENTS:

1. Plotting and study of demand and supply curves for major agricultural commodities. **(3hrs)**
2. Calculation of elasticities for important agricultural commodities. **(3hrs)**
3. Study of relationship between market arrivals and prices of some selected commodities. **(4hrs)**
4. Computation of marketable and marketed surplus of important commodities. **(4hrs)**
5. Study of price behaviour over time for some selected commodities. **(4hrs)**
6. Estimation and calculation of marketing costs, margins and price spread and presentation of report in the class. **(4hrs)**
7. Visit to SWC/CWC to study their objectives, role, organization, functioning and performance. **(4hrs)**
8. Visit to FCI and study its objectives, role organization and functioning and performance. **(4hrs)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: IV**

Course Title: Manures, Fertilizers & Soil Fertility **Course Code: SSAC221**

No. of Hrs: 30 **Credits: 2**

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 analysisand mixed fertlizer 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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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: IV**

Course Title: Manures, Fertilizers & Soil Fertility -Practical **Course Code: SSAC221P**

No. of Hrs: 30 **Credits:1**

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. potash or Sulphate of potash by using Flame photometer **(4hrs)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Agriculture & Rural Development **Semester: IV**

Course Title: Production Technology for Medicinal & Aromatic Plants **Course Code: HORT282**

No. of Hrs:15 **Credits: 1**

Objectives

- To Identify ornamental plants
- To Identify Medicinal and Aromatic Plants.
- To prepare and planting of Medicinal and Aromatic Plants.

Course Outcomes

CO1: Explain the principles of landscaping and importance of ornamental plants.

CO2: Discuss the production technology of different types of ornamental crops.

CO3: Examine the production technology of medicinal and aromatic crops.

CO4: Discuss the methods of value addition in ornamental, medicinal and aromatic crops.

UNIT – 1 (3 Hours)

1. Importance and scope of ornamental crops and landscaping - Landscape uses of trees, shrubs and climbers.
2. Principles of landscaping - Initial approach – Axis – Focal Point – Mass effect – Unity – Space – Divisional Lines – Proportion and Scale – Texture – Time and Light – Tone and Colour – Mobility – Rhythm – Balance – Contract – Harmony- Vista – Style.
3. Production technology of cut flowers under protected conditions -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.
4. Gerbera - 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.

UNIT – II (3 Hours)

1. Carnation - 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.

2. Lilium and Orchids - Introduction- Origin and distribution- Classification- Species and varieties- Climate and soil requirements- Propagation- Land preparation Planting- Manures and fertilizers- Cultural operations- Use of growth regulators Physiological disorders Harvesting- Post harvest management and yield.
3. Production technology of cut flowers under open conditions - Gladiolus and Tuberose Introduction- Origin and distribution- Classification of varieties- Species and varieties Climate and soil requirements- Propagation- Land preparation Planting- Manures and fertilizers- Cultural operations- Use of growth regulators Physiological disorders- Harvesting Post harvest management and yield.

UNIT – III (3 Hours)

1. Chrysanthemum - 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. Loose flowers - Marigold and Jasmine under open conditions - Introduction- Origin and distribution- Species and varieties- F1 hybrids- Cimate 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. Medicinal plants – Scope and Importance – Production technology of Asparagus, Aloe, Costus - Botanical name – Family - Origin - Economic part - Introduction – Climate – Soil - Varieties – Propagation – Planting - Manuring - Irrigation Intercultural operations - Harvesting - Yield.

UNIT – IV (3 Hours)

1. Periwinkle, Isabgol -Botanical name – Family - Origin - Economic part Introduction – Climate – Soil - Varieties – Propagation – Planting - Manuring Irrigation -Intercultural operations - Harvesting - Yield.
2. Aromatic plants – Importance – Essential oil industry in India – Properties of essential oils – Production technology of Mint and Ocimum - Botanical name – Family - Origin - Economic part - Introduction – Climate – Soil - Varieties – Propagation – Planting - Manuring - Irrigation - Intercultural operations Harvesting - Yield.
3. Lemongrass, Citronella, Palmarosa - Botanical name – Family - Origin - Economic part - Introduction – Climate – Soil - Varieties – Propagation – Planting - Manuring - Irrigation - Intercultural operations - Harvesting - Yield.

UNIT – V (3 Hours)

1. Geranium and Vettiver - Botanical name – Family - Origin - Economic part Introduction.

– Climate – Soil - Varieties – Propagation – Planting - Manuring Irrigation - Intercultural operations - Harvesting - Yield.

2. Processing and value addition in ornamental crops and MAPs produce – Dry flower making - Extraction methods of essential oils.

References text books

1. Bose, T.K. 1999. Floriculture and Landscaping. Naya Prakash, Kolkata. Bose, T.K. and Yadav, L.P. 1992. Commercial Flowers. Naya Prakash, Kolkata.
2. Randhawa, G.S. and Mukhopadhyaya, A. 1994. Floriculture in India. Allied Publishers Pvt. Ltd., New Delhi
3. Chattopadhyay, S.K. 2007.Commercial Floriculture. Gene-Tech Books, New Delhi Srivastava, H.C.2014. Medicinal and Aromatic Plants. ICAR, New Delhi

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: IV**

Course Title: Production Technology for Medicinal & Aromatic Plants - Practical **Course Code: HORT282P**

No. of Hrs:30 **Credits:1**

Objectives:

- To Identify ornamental plants
- To Identify Medicinal and Aromatic Plants.
- To know Bed preparation and planting of Medicinal and Aromatic Plants.

Course Outcomes:

CO1: Explain Importance and scope of ornamental crops and landscaping

CO2: Outline the Principles of landscaping

CO3: Explain Production technology of cut & loose flowers under protected conditions

EXPERIMENTS:

1. Identification of ornamental plants. **(3hrs)**
2. Identification of Medicinal and Aromatic Plants. **(3hrs)**
3. Nursery bed preparation and flower seed sowing. **(3hrs)**
4. Training and pruning of roses. **(3hrs)**
5. Bed preparation and planting of Medicinal and Aromatic Plants. **(3hrs)**
6. Harvesting and postharvest handling of cut and loose flowers. **(3hrs)**
7. Floral preservatives to prolong vase-life of cut flowers. **(3hrs)**
8. Visit to the commercial flower unit. **(3hrs)**
9. Visit to the commercial MAP unit. **(4hrs)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: IV**

Course Title: Entrepreneurship Development & Business **Course Code: AEXT292**

No. of Hrs:15 **Credits: 1**

Objectives

- To visit any one Agri - based industries/ business – Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis.
- To study about the constraints in setting up of agro based industries.
- To study about the formulation of project feasibility reports.

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 (3 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 (3 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 (3 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 (3 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 (3 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

1. 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

2. 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
3. Khanka, S.S. 1999. Entrepreneurship Development. S. Chand and Co., New Delhi

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: IV**

Course Title: Entrepreneurship Development & Business -Practical **Course Code: AEXT292P**

No. of Hrs:30 **Credits:1**

Objectives:

- To study about any one Agri - based industries/ business – Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis.
- To study about constraints in setting up of agro based industries Formulation of project feasibility reports and industrial and agri-business houses.
- To study formulation of project feasibility reports.

Course Outcomes:

CO1: Learn of entrepreneur, entrepreneurship

CO2: Explain Characteristics of entrepreneurs - Opportunities for entrepreneurship and rural entrepreneurship

CO3: Learn Entrepreneurship development programmes (EDPs) and SWOT Analysis

EXPERIMENTS:

1. Field visits to study any one Agri - based industries/ business – Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis. **(3hrs)**
2. Field visits to study the constraints in setting up of agro based industries Formulation of project feasibility reports and industrial and agri-business houses. **(3hrs)**
3. Field visits to study the formulation of project feasibility reports. **(3hrs)**
4. Field visits to study the industrial and agri-business houses. **(3hrs)**
5. Field visits to study the characteristics of successful entrepreneurs. **(3hrs)**
6. Field visits to study the any one of the Local Financial Institutions to study the MSME Policies. **(3hrs)**
7. Field visits to study the Entrepreneurial Development Institute to study the Process of Entrepreneurship Development. **(4hrs)**
8. Field visits to the local Public - Private Enterprises to study the managerial skills and achievement motivation. **(4hrs)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: IV**

Course Title: Renewable Energy & Green Technology **Course Code: AENG252**

No. of Hrs:15 **Credits: 1**

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.
3. Biogas - Principles of biogas production, advantages, disadvantages, utilization.
4. 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

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

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: IV**

Course Title: Renewable Energy & Green Technology - Practical **Course Code: AENG252P**

No. of Hrs:30 **Credits:1**

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)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: IV**

Course Title: Livestock & Poultry Management **Course Code: LSPM201**

No. of Hrs:30 **Credits: 2**

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 – 1 (6 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 (6 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 (6 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 (6 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 (6 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.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: IV**

Course Title: Live-Stock & Poultry Management-Practical **Course Code: LSPM201P**

No. of Hrs: 30 **Credits:1**

Objectives:

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

Course Outcomes:

CO1: Explain Demographic distribution of live-stock population

CO2: Outline Population dynamics of live-stock and role in Indian economy

CO3: Clasify Design and construction of live-stock and poultry buildings and Incubation, hatching and brooding

EXPERIMENTS:

1. Familiarizing with body points/parts of different domesticated animals and poultry. **(3hr)**
2. Approaching, handling methods of restraining. **(3hrs)**
3. Casting of live-stock. **(3hrs)**
4. Identification methods of farm animals and poultry (branding, tattooing, notching & tagging). **(3hrs)**
5. A visit to the live-stock and poultry farms. **(3hrs)**
6. Various breeds and familiarizing with various farm routines and farm records. **(3hrs)**
7. Hatching equipment Hatchery operations and incubation. **(3hrs)**
8. Management of chicks, growers and layers. **(3hrs)**
9. Debeaking, dusting and vaccination. **(3hrs)**
10. Economics of cattle, buffalo, sheep, goat, swine and poultry production **(3hrs)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: IV**

Course Title: Statistical Methods **Course Code: SMCA201**

No. of Hrs:15 **Credits: 1**

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 – 1 (3Hours)

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 Hours)

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

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: IV**

Course Title: Statistical Methods-Practical **Course Code: SMCA201P**

No. of Hrs:30 **Credits:1**

Objectives:

- To Prepare frequency distribution for ungrouped data
- To Prepare various graphs and charts
- To Computate of A.M, Median and Mode for grouped and un-grouped data by direct and deviation methods.

Course Outcomes:

CO1: Explain Importance of Statistics in agriculture - limitations of statistics.

CO2: Classify about Frequency Distribution

CO3: Outcome about Measures of Dispersion and Testing of Hypothesis

EXPERIMENTS:

1. Preparing frequency distribution for ungrouped data by using inclusive and exclusive methods and calculation of quartile - Deciles and Percentiles. **(3hrs)**
2. Preparing various graphs and charts. **(3hrs)**
3. Computation of A.M, Median and Mode for grouped and un-grouped data by direct and deviation methods. **(4hrs)**
4. Problems on calculating skewness and kurtosis - S.D and CV% for grouped data **(4hrs)**
5. Problems on probability. **(4hrs)**
6. Problems on binomial and poisson distributions. **(4hrs)**
7. Normal curve and its properties, identification of normality through data i.e., criterion. etc., - Expression for frequency function of normal distribution. **(4hrs)**
8. Problems on Z- test for one Sample - Two sample with known and unknown conditions. **(4hrs)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: IV**

Course Title: Rural Development Planning & Management **Course Code: PMRD 202**

No. of Hrs:30 **Credits: 2**

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.)

1. Types of Planning Process

Unit II (6 Hrs.)

1. Decentralization of Planning

Unit III (6 Hrs.)

1. Micro Level Planning (Village Level Planning)

Unit IV (6 Hrs.)

1. Block and District Level Planning- Strategies for Sustainable Development

Unit V (6 Hrs.)

1. District Planning

Reference books:

1. 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.
2. CGD (2011) Cash on Delivery: a New Approach Financing Foreign Aid. Publisher's Notes, Centre for Global Development, Washington DC.
3. Available from: http://www.cgdev.org/content/publications/detail/1423949/ [Accessed 20 May 2013]

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: V**

Course Title: Geo informatics & Nanotechnology **Course Code: AGRO301**

No. of Hours: 30 Hrs. **Credits: 2**

Objectives

- To learn SSAC GIS software, spatial data creation and editing.
- To learn SSAC Image processing software.
- To learn SSAC Visual and digital interpretation of remote sensing images.

Course Outcomes

CO1: AGRO Precision agriculture: concepts and techniques-Issues and concerns for Indian agriculture.

CO2: AGRO Geo-informatics- definition, concepts, tools and techniques and their use in Precision Agriculture.

CO3: AGRO Crop discrimination and Yield monitoring techniques.

CO4: AGRO Spatial data and their management in GIS & AGRO Application of nanotechnology in agriculture - tillage, seed, water, fertilizers, plant protection for scaling-up farm productivity.

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

1. AGRO Precision agriculture: concepts and techniques-Issues and concerns for Indian agriculture.
2. AGRO Principles and practices of precision agriculture.
3. AGRO Geo-informatics- definition, concepts, tools and techniques and their use in Precision Agriculture.
4. AGRO Crop discrimination and Yield monitoring techniques.

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

1. AGRO Global positioning system (GPS) –Components and its application in agriculture.
2. AGRO Geodesy and its basic principles.
3. AGRO Spatial data and their management in GIS.

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

1. AGRO Application of nanotechnology in agriculture - tillage, seed, water, fertilizers, plant protection for scaling-up farm productivity.
2. SSAC Cartography, units of cartography, map scale, various symbols used in cartography, Soil mapping techniques.
3. SSAC Remote sensing- concepts, Spectral reflectance of various earth features, atmospheric windows.

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

1. SSAC Image processing and interpretation - geo referencing - supervised and unsupervised classification of RS images. STCR approach for precision agriculture - principles and computations.
2. SSAC Applications of remote sensing techniques in the field of agriculture and allied sciences including drones.
3. SSAC Spatial variability of soil fertility, its determination, fertilize recommendation using geospatial technologies in precision farming.

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

1. SSAC Nanotechnology, definition, concepts and techniques – Nano scale –definition – Nano-particles, materials - occurrence – properties.
2. SSAC Characterization of nano-materials - structural characterization - Nano-sensors.
3. SSAC Nano-fertilizers, nano-pesticides - importance and advantages –synthesis– strategies.

References

1. Pradeep. T. 2007. NANO: The Essentials: Understanding Nanoscience and Nanotechnology. Tata McGraw-Hill Publishing Company Limited, New Delhi
2. Lillesand, T.M. and Kiefer, R. W. 1994. Remote sensing and image interpretation. (3rd edition), John Wiley and Sons.
3. Anji Reddy, M. 2006. Text book of Remote sensing and Geographical Information Systems, (3rd edition), B.S. Publications, Hyderabad.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: V**

Course Title: Geo informatics & Nanotechnology – Practical **Course Code: AGRO301P**

No. of Hours: 30 Hrs. **Credits: 1**

Objectives:

- To develop the methodology for identifying the causes of within field variation in crop performance.
- To discuss the practical guidelines required to implement precision farming technology to achieve best management.
- To explore the possibility of using remote sensing methods and GIS to enable management decision to be made in real time during the growth of the crop.

Course Outcomes:

CO1: Explain the SSAC GIS software, spatial data creation and editing and processing software.

CO2: Summarise AGRO Supervised and unsupervised classification and acreage estimation.

CO3: Explain soil fertility based on GIS & Outline productivity and management zones and Fertilizers recommendations based of VRT and STCR techniques.

EXPERIMENTS:

1. SSAC GIS software, spatial data creation and editing. **(4hrs)**
2. SSAC Image processing software. **(4hrs)**
3. SSAC Visual and digital interpretation of remote sensing images. **(4hrs)**
4. SSAC Generation of spectral profiles of different objects. **(3hrs)**
5. AGRO Supervised and unsupervised classification and acreage estimation. **(3hrs)**
6. SSAC Multispectral remote sensing for soil mapping. **(3hrs)**
7. SSAC Creation of thematic layers of soil fertility based on GIS. **(3hrs)**
8. AGRO Creation of productivity and management zones. **(3hrs)**

9. AGRO Fertilizers recommendations based of VRT and STCR techniques. **(3hrs)**

SCHEME OF EVALUATION:

S. No.	Experiment	Marks (50)
01	Major Experiment	15Marks
02	Minor Experiment	10Marks
03	Viva	10Marks
04	Record	10Marks
05	Skills	05Marks

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Agriculture & Rural Development **Semester: V**

Course Title: Environmental Studies & Disaster Management **Course Code: CPHY361**

No. of Hours: 15 Hrs. **Credits: 1**

Objectives

- Collection, processing and storage of effluent samples.
- Determination of chemical oxygen demand in waste water sample.
- Estimation of dissolved oxygen in waste water sample.

Course Outcomes

CO1: Environmental studies - Definition – Scope and importance.

CO2: Natural resources – Renewable and non-renewable resources.

CO3: Resources – Sources, uses and over utilization of surface and groundwater - Dams – Benefits and problems – Sustainable management of water.

CO4: Threats to biodiversity – Habitat loss – Poaching of wild life – Man-wild life conflicts – Conservation of biodiversity – In situ and ex situ & Environmental pollution – Causes, effects and control measures of air and water pollution – Tolerable limits for toxic gases in air.

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

1. Environmental studies - Definition – Scope and importance, need for public awareness, people and institutions in environment.
2. Natural resources – Renewable and non-renewable resources – Forest resources – Functions of forests – Causes and consequences of deforestation.
3. Water resources – Sources, uses and over utilization of surface and groundwater - Dams – Benefits and problems – Sustainable management of water.
4. Food resources – Food sources, world food problems and food security.

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

1. Energy resources – Renewable and non-renewable energy sources and their impact on environment.
2. Land resources – Land degradation, desertification and land use planning – Role of an individual in conservation of natural resources.

3. Biodiversity – Definition – Types of biodiversity – Bio-geographical classification in India – Methods of measuring biodiversity – Biodiversity Act – Functions of National Biodiversity Board.

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

1. Threats to biodiversity – Habitat loss – Poaching of wild life – Man-wild life conflicts – Conservation of biodiversity – In situ and ex situ.
2. Environmental pollution – Causes, effects and control measures of air and water pollution – Tolerable limits for toxic gases in air.
3. Causes, effects and control measures of soil pollution – Bioremediation – Tolerable limits for heavy metals in soil.

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

1. Causes, effects and control measures of thermal, marine and noise pollution, nuclear hazards.
2. Solid waste management – Need of waste management – Types of solid waste – Management processing technologies.
3. Disaster management - Natural Disasters – Meaning and nature of natural disasters, types and effects - Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, heat and cold waves - Manmade disasters – Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, road accidents, rail accidents, air accidents, sea accidents. – International strategy for disaster reduction - Concept of disaster management - National disaster management framework - Financial arrangements - Role of NGOs, community-based organizations and media, Central, state, district and local administration, Armed forces, police and other organizations in disaster response.

UNIT-V (6 Hrs.)

1. Social issues and the environment – Unsustainable to sustainable development – The Environment Protection Act – The air (prevention and control of pollution) act - The water (prevention and control of pollution) act – The wildlife protection act - Forest conservation act.
2. Woman and child welfare – Human immuno-deficiency virus (HIV)/ acquired immunodeficiency syndrome (AIDS) – Role of information technology on environment and human health.

Prescribed Text Book

1. Bharucha, E. 2005. Text book of Environmental Studies for undergraduate courses. University Grants Commission, New Delhi.

Reference

1. Anjaneyalu, Y. 2004. Introduction to Environmental Science. BS Publications, Hyderabad, A.P. India.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: V**

Course Title: Environmental Studies & Disaster Management - Practical **Course Code: CPHY361P**

No. of Hours: 30 Hrs. **Credits: 1**

Objectives:

- To explain collection of samples.
- To estimation of dissolved oxygen.
- To analysis of hardiness of water.

Course Outcomes:

CO1: Explain Collection, processing and storage of effluent samples.

CO2: Discuss Determination of chemical oxygen demand in waste water sample and total dissolved solids in waste water sample.

CO3: Outline temporary hardness of waste water sample by titration.

PRACTICALS:

1. Collection, processing and storage of effluent samples. **(4hrs)**
2. Determination of chemical oxygen demand in waste water sample. **(4hrs)**
3. Estimation of dissolved oxygen in waste water sample. **(4hrs)**
4. Determination of total dissolved solids in waste water sample. **(4hrs)**
5. Analysis of temporary hardness of waste water sample by titration. **(4hrs)**
6. Analysis of total hardness of waste water sample by titration. **(4hrs)**
7. Preparation of sludge / waste water sample for analysis of heavy metals. **(3hrs)**
8. Estimation of heavy metals in sludge / waste water by Atomic Adsorption Spectrophotometer (AAS). **(3hrs)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: V**

Course Title: Principles of Food Science & Nutrition **Course Code: BICM300**

No. of Hours: 30 Hrs. **Credits: 2**

Objectives

- To understand Minerals, pigments, colours, flavors of food.
- To learn Natural emulsifiers and organic acids in food.
- To understand Oxidants and antioxidants of available food.

Course Outcomes

CO1: Explain Concepts of food science - Definitions of food, specific nutrients in foods and their functions.

CO2: Explain Food physical characteristics.

CO3: Outline Food composition.

CO4: Explain biomolecule of Carbohydrates, Proteins, Fatty acids and food additives.

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

1. Concepts of food science - Definitions of food, specific nutrients in foods and their functions - Physical characteristics of foods – Importance,
2. Food physical characteristics - Density - Phase change, pH, osmosis, surface tension, colloidal systems.
3. Food composition - Food chemistry - Water, solutions, water balances in body, clinical signs of water depletion, excessive water intake, recommended requirements,
4. Carbohydrates - Structure, properties of sugars, starches, cellulose and hemicelluloses, pectin, gums.
5. Proteins - Structure, amino-acids, properties.
6. Fats and oils - Structure, functional aspects.
7. Vitamins - Retinol, vitamin D, vitamin E, vitamin K, ascorbic acid, B-complex group,

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

1. Minerals, pigments, colours, flavours
2. Natural emulsifiers.
3. Organic acids.

4. Oxidants and antioxidants.

5. Enzymes.

6. Food microbiology - Morphology and fine structure of bacteria - Cultivation of bacteria, nutritional requirements -Nutritional classification of bacteria.

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

1. Introduction to yeast, algae and protozoa and virus, general characteristics.
2. Microbial spoilage of foods - Factors affecting kinds, numbers, growth and survival of microorganisms in foods.
3. Production of fermented foods - Production, purification and estimation of beer/ ethanol.
4. Preservation by heat treatment - Principle and equipment for blanching.
5. Preservation by heat treatment - Canning, pasteurization, sterilization.

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

1. Preservation by use of low temperature - Principle, methods, equipment.
2. Preservation by chemicals - Antioxidants, mould inhibitors, antibodies, acidulants, etc.
3. Preservation by irradiation - Principle, methods, equipment.
4. Preservation by fermentation - Principles, methods, equipment.
5. Preservation by drying, dehydration and concentration - Principle, methods, equipment.
6. Food and nutrition - History of diet around the world - European diet.
7. Malnutrition (over and under nutrition), body cell, digestion and absorption, energy and calories, obesity and weight control.

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

1. Nutritional disorders that can compromise health.
2. Energy metabolism - Carbohydrates, individual sugars, sugars and diabetes mellitus, glycemic response, dietary carbohydrates.
3. Energy metabolism - Fat, synthesis, control, biosynthesis, cellular degradation, peroxidation.
4. Energy metabolism - Proteins, synthesis, catabolism, ammonia and urea.
5. Balanced/modified diets, diet selection.
6. Menu planning.
7. New trends in food science and nutrition.

References

1. Sumati R. Mudambi, Shalini M. Rao and M.V. Rajagopal. 2006. Food Science, 2nd Ed. New Age International (P) Limited, New Delhi.
2. Martin Eastwood. 2003. Principles of Human Nutrition. Blackwell Science Ltd., Oxford.

3. Norman N. Potter. 1998. Food Science, 5th Ed. Springer Science+ Business Media, New York.
4. Michael J. Pelczar Jr., E.C.S. Chan and Noel R. Krieg. 1998. Microbiology, 5th Ed. Tata McGraw-Hill Education, New Delhi.
5. William C. Frazier and & Dennis C. Westfoff. 1987. Food Microbiology, 4th Ed. Tata McGraw-Hill Education, New Delhi.
6. L.E. Casida Jr. 1968. Industrial Microbiology. New Age International Publishers, New Delhi.
7. P. Fellows. 2000. Food Processing Technology: Principles and Practice, 2nd Ed. CRC Press, Boca Raton, FL, USA.
8. Marcus Karel and Darvl B. Lund.2003. Physical Principles of Food Preservation, 2nd Ed. Marcel Dekker, Inc., NY, USA.
9. Gerald Wiseman. 2002. Nutrition and Health. Taylor & Francis, London.
10. An Introduction to Nutrition, v. 1.0

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: V**

Course Title: Principles of Food Science & Nutrition - Practical **Course Code: BICM300P**

No. of Hours: 30 Hrs. **Credits: 1**

Objectives:

- To understand the basics of and concepts of food.
- To understand food composition.
- To explain functions and vitamins.

Course Outcomes:

CO1: Explain concepts of food science.

CO2: Discuss food composition.

CO3: Explain structure and functions of proteins, fats and oils.

EXPERIMENTS:

1. Food groups- Grouping of foods, discussion on nutritive value. **(3hrs)**
2. Measuring ingredients methods of measuring different types of foods- grains, flours and liquids. **(3hrs)**
3. Edible portion: Determination of edible portion of edible portion percentage of different foods. **(3hrs)**
4. Cooking methods moist heat methods-(i) boiling, simmering, steaming and pressure cooking (ii) Dry methods- baking. **(3hrs)**
5. Methods of cooking fine and coarse cereals and examination of starch. **(3hrs)**
6. Cooking and soaked and unsoaked pulses, common preparation with pulses. **(3hrs)**
7. Milk and milk products: common preparation with milk, cheese and curd, cheese curry and cooking vegetable milk. **(3hrs)**
8. Flesh foods: Fish, meat and poultry preparations. **(3hrs)**

9. Beverages preparation of hot beverages-coffee, tea. **(3hrs)**
10. Preparation of cold beverages fruit drink and milk shake. **(3hrs)**

SCHEME OF EVALUATION:

S. No.	Experiment	Marks (50)
01	Major Experiment	15Marks
02	Minor Experiment	10Marks
03	Viva	10Marks
04	Record	10Marks
05	Skills	05Marks

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Agriculture & Rural Development **Semester: V**

Course Title: Crop Improvement - I **Course Code: GPBR311**

No. of Hours: 30 Hrs. **Credits: 2**

Objectives

- To explain Hybridization techniques and precautions to be taken, floral morphology, selfing, emasculation and crossing techniques in field crops.
- To discuss floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in rice.
- To outline floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Wheat and Barley.

Course Outcomes

CO1: Explain Introduction – General Breeding Objectives, Concepts of breeding self-pollinated, cross pollinated and vegetatively propagated crops.

CO2: Discuss Cereals, Rice, Origin, Distribution of species – Wild relatives and forms – Breeding objectives – Major breeding procedures.

CO3: Explain Cereals - Wheat and Barley - Origin – Distribution of species – Wild relatives and forms – Breeding objectives – Major breeding procedures.

CO4: Outline Pulses and oilseeds - , coconut, oil palm, Pigeonpea - Origin – Distribution of species – Wild relatives and forms – Breeding objectives – Major breeding procedures.

UNIT-I **(6 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 Pearlmillet - 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 **(6 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 **(6 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 - Horsegram, Fieldpea 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 **(6 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 **(6 Hrs.)**

1. Oilseeds - Rapeseed and 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 Oilpalm - 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.

References

1. Allard, R.W. 1960. Principles of Plant Breeding. John Wiley & Sons, New York.
2. Phundan Singh. 2006. Essential of Plant Breeding. Kalyani Publishers, Ludhiana.
3. Poehlman, J.M. and Borthakur, D. 1995. Breeding of Asian Field Crops. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
4. Sharma, J.R. 1994. Principles and Practices of Plant Breeding. Tata McGraw-Hill Publishing Co. Ltd., New Delhi.
5. Kalloo, G.1994. Vegetable Breeding. Panima Educational Book Agency,New Delhi.
6. Kumar, N.2006. Breeding of Horticultural Crops-Principles and Practices. New India Publishing Agency, New Delhi.
7. George Acquaah. 2012. Principles of Plant Genetics and Breeding. Blackwell Publishing Ltd.,USA.
8. Mono graphs available on specific crops.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: V**

Course Title: Crop Improvement – I – Practical **Course Code: GPBR311P**

No. of Hours: 30 Hrs. **Credits: 1**

Objectives:

- To know the floral biology.
- To explain hybridization techniques.
- To explain emasculation techniques.

Course Outcomes:

CO1: Explain Hybridization techniques and precautions to be taken, Floral morphology, selfing, emasculation and crossing techniques in field crops.

CO2: Explain Hybridization techniques and precautions to be taken, Floral morphology, selfing, emasculation and crossing techniques in millets.

CO3: Explain Hybridization techniques and precautions to be taken, Floral morphology, selfing, emasculation and crossing techniques in peas.

EXPERIMENTS:

1. Hybridization techniques and precautions to be taken, Floral morphology, selfing, emasculation and crossing techniques in field crops. **(4hrs)**
2. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in rice. **(4hrs)**
3. 3 Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Wheat and Barley. **(4hrs)**
4. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Maize and Sorghum. **(3hrs)**
5. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Pearl millet and Finger millet. **(3hrs)**
6. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Kodo millet and Proso millet. **(3hrs)**
7. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Chickpea and Pigeonpea. **(3hrs)**

8. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Urdbeanand Mungbean. **(3hrs)**
9. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Soyabeanand Cowpea. **(3hrs)**

SCHEME OF EVALUATION:

S. No.	Experiment	Marks (50)
01	Major Experiment	15Marks
02	Minor Experiment	10Marks
03	Viva	10Marks
04	Record	10Marks
05	Skills	05Marks

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Agriculture & Rural Development **Semester: V**

Course Title: Problematic Soils and their Management **Course Code: SSAC321**

No. of Hours: 15 Hrs. **Credits: 1**

Objectives

- To explain determination of pH, EC of acid, saline and sodic soils.
- To discuss determination of ESP of sodic soils.
- To identify determination of GR of sodic soils.

Course Outcomes

CO1: Discuss Problem soils –Definition – Different types of problematic soils.

CO2: Explain Salt affected soils – Origin and formation.

CO3: Identify Saline soils – Visual symptoms for identification of saline soils.

CO4: Outline Sodic soils - Visual symptoms for identification of sodic soils & examine Acid soils.

UNIT-I **6 (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 **(6 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 **(6 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 **(6 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 **(6 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. 16. Guidelines for judging quality of water - Utilization of saline water in agriculture.

References

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. Soils of Andhra Pradesh, Monograph of I.V. Subbarao.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: V**

Course Title: Problematic Soils and their Management - Practical **Course Code: SSAC321P**

No. of Hours: 30 Hrs. **Credits: 1**

Objectives:

- To explain identification of problematic soil samples.
- To explain EC and pH.
- To explain infiltration of soils.

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 visit to degraded lands. **(3hrs)**
2. Determination of infiltration rates of light soils. **(3hrs)**
3. Determination of infiltration rates of heavy soils. **(3hrs)**
4. Determination of aggregate stability of sodic soils. **(3hrs)**
5. Determination of pH, EC of acid, saline and sodic soils. **(3hrs)**
6. Determination of ESP of sodic soils. **(3hrs)**
7. Determination of GR of sodic soils. **(3hrs)**
8. Determination of LR of acid soils. **(3hrs)**
9. Determination of lime content ($CaCO_3$) of calcareous soil. **(3hrs)**
10. Determination of pH and EC of saline, sodic and good quality irrigation water. **(3hrs)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: V**

Course Title: Protected Cultivation & Post-harvest Technologies **Course Code: AENG351**

No. of Hours: 15 Hrs. **Credits: 1**

Objectives

- Study of different types of greenhouses based on shape, etc.
- Computing the rate of air exchange in an active summer and winter cooling systems.
- Visit to post harvest technology units and laboratories.

Course Outcomes

CO1: Explain definition, greenhouse effect, advantages of green houses.

CO2: Outline types of greenhouses - Greenhouses based on shape, utility, construction, covering materials and cost, shade nets.

CO3: Summarise criteria and constructional details of greenhouses - Construction of pipe framed greenhouses, material requirement, preparation of materials and procedure of erection.

CO4: Explain irrigation system used in greenhouses - Rules of watering, hand watering, perimeter watering, overhead sprinklers, boom watering and drip irrigation

UNIT-I **(3 Hrs.)**

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 **(3 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, poly vinyl 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 **(3 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 **(3 Hrs.)**

1. Designing postharvest 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 **(3 Hrs.)**

1. Commercial grain dryers - Deep bed, flat bed, tray, fluidised bed, recirculated and solar dryers.
2. Material handling equipment - Bucket elevator and screw conveyer and their selection.
3. Primary processing of cereals, pulses and oilseeds - Cleaning, grading and packaging.

References

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2. 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.
3. Sahay, K.M. and Singh, K.K. 1994. Unit operations of Agricultural Processing. Vikas Publishing house Pvt. Ltd. New Delhi.
4. Chakraverty, A. Post-Harvest Technology of cereals, pulses and oilseeds. Oxford & IBH publishing Co. Ltd., New Delhi.

5. Ojha, T.P and Michael, A.M. Principles of Agricultural Engineering, Vol. I, Jain Brothers, Karol Bag, New Delhi.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: V**

Course Title: Protected Cultivation and Post-harvest Technologies - Practical **Course Code: AENG351P**

No. of Hours: 30 Hrs. **Credits: 1**

Objectives:

- To identify the different types of green houses.
- 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. **(4hrs)**
2. Computing the rate of air exchange in an active summer and winter cooling systems. **(4hrs)**
3. Feasibility study on drying of agricultural products inside a greenhouse and its calculation. **(4hrs)**
4. Visit to post harvest technology units and laboratories. **(4hrs)**
5. Determination of moisture content of various grains by oven drying and infrared methods. **(4hrs)**
6. Determination of size, space, porosity, bulk density, etc., of grains. **(4hrs)**
7. Determination of aerodynamic properties of grains. **(3hrs)**
8. Cleaning and grading of grains, pulses and oilseeds. **(3hrs)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: V**

Course Title: Pests of Field Crops & Stored Grain Management **Course Code: ENTO331**

No. of Hours: 30 Hrs. **Credits: 2**

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: Discuss General account on nature and type of damage by different arthropod pests.

CO2: Explain Economic Entomology and Economic Classification of Insect Pests.

CO3: Describe Pests of rice.

CO4: Explain Pests of sorghum and other millets & Examine Pests of cotton

UNIT-I **(6 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 field crops.
2. Introduction of Economic Entomology and Economic Classification of Insect Pests.
3. 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 **(6 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 **(6 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. Sunhemp- Hairy caterpillars, stem borer and flea beetle. IPM Practices.
3. Pulses- Gram caterpillar, plume moth, pod fly, stem fly, spotted pod borer, cowpea aphid, cowbug, pod bug, leafhopper, stink bug, green pod boring caterpillar, blue butterflies, leaf webber/borer and redgram mite. Soyabean- Stem fly, stem girdler, ragi cutworm, leaf miner and whitefly- IPM Practices. Pea- pea leaf miner and pea stem fly.

UNIT-IV **(6 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 **(6 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.

References

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. Nair MRGK. 1986. Insects and Mites of crops in India. Indian Council of Agricultural Research New Delhi.
4. Ramakrishna Ayyar, T.V. 1963. Handbook of Economic Entomology for South India. Government Press, Madras.
5. Dennis S Hill 1987 Agricultural Insect Pests of tropics and their control, Cambridge Universtiy Press, New York
6. Upadhyaya K.P. and Kusum Dwivedi. 1996. A Text Book of Plant Nematology. Aman Publishing House, Meerut.
7. Khare, S.P. 1993. Stored Grain Pests and their Management. Kalyani Publishers, Ludhiana.
8. Atwal, A.S. 1976. Agricultural Pests of India and South East Asia. Kalyani Publishers, Ludhiana.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: V**

Course Title: Pests of Field Crops & Stored Grain Management -Practical **Course Code: ENTO331P**

No. of Hours: 30 Hrs. **Credits: 1**

Objectives:

- To identify various insect pests.
- To calculate the doses of insecticides.
- To identify and control pets 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 crop 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. **(3hrs)**
2. 2 Calculations on the doses of insecticides and their application techniques. **(3hrs)**
3. 3 Identification of major insect pests of rice and their damage symptoms. **(3hrs)**
4. 4 Identification of major insect and mite pests of sorghum, maize and other millets, and their damage symptoms. **(3hrs)**
5. 5 Identification of insect pests of sugarcane and their damage symptoms. **(3hrs)**
6. 6 Identification of insect pests of cotton, sunhemp and mesta and their damage symptoms. **(3hrs)**
7. Identification of insect pests of pulse crop and their damage symptoms. Identification of insect pests of oil seed crops and their damage symptoms. **(3hrs)**
8. Mite pests of crops and their damage symptoms. **(3hrs)**
9. Nematode pests of crops and their damage symptoms. **(3hrs)**

10. Rodent pests of crops and their nature of damage. **(3hrs)**

SCHEME OF EVALUATION:

S. No.	Experiment	Marks (50)
01	Major Experiment	15Marks
02	Minor Experiment	10Marks
03	Viva	10Marks
04	Record	10Marks
05	Skills	05Marks

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture and Rural Development **Semester: V**

Course Title: Diseases of Field Crops and their Management - I **Course Code: PATH371**

No. of Hours: 30 Hrs. **Credits: 2**

Objectives

- To understand Rice diseases.
- To identify Wheat, Sorghum and Bajra diseases.
- To explain Maize and Finger millet diseases.

Course Outcomes

CO1: Explain Rice diseases.

CO2: Explain Maize diseases.

CO3: Explain Sorghum diseases.

CO4: Summarize Bajra, Sugarcane, Bengal gram and Tobacco diseases.

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

Study of etiology, symptoms, host-parasite relationship and specific management practices of the following diseases.

1. Rice diseases – blast, brown spot.
2. Rice diseases – Sheath rot, Stem rot, narrow brown leaf spot.
3. Rice diseases – sheath blight, False smut, Bacterial leaf blight.
4. Rice diseases – Bacterial leaf streak, Rice Tungro Disease, Khaira.
5. Wheat diseases – Black or stem rust, orange rust, yellow rust.
6. Wheat diseases - loose smut, Karnal bunt.
7. Wheat diseases – Powdery mildew, alternaria blight, Tundu disease.

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

1. Sorghum diseases – Anthracnose, rust, ergot, headmold, leaf blight.
2. Sorghum diseases - smuts, charcoal rot, downy mildew, Striga.

3. Maize diseases - Turcicum leaf blight, post flowering stalk rots, charcoal rot.
4. Maize diseases - Banded leaf and sheath blight, downy mildew.
5. Bajra diseases – Downy mildew/green ear, rust, ergot, smut.

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

1. Ragi/Fingermillet diseases- blast, smut, mosaic.
2. Cotton diseases– Bacterial blight, Fusarium wilt, Verticillium wilt, root rot.
3. Cotton diseases – grey mildew, anthracnose, Alternaria leaf spot, Cercospora leaf spot, Helminthosporium leaf spot, rust.
4. Sugarcane diseases – red rot, whip smut, wilt, ring spot.
5. Sugarcane diseases – Grassy shoot, mosaic, ratoon stunting, rust, Pokah Boeng.
6. Tobacco diseases –black shank, Damping off, Frog eye spot, brown spot, black root rot.

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

1. Tobacco diseases – Mosaic, leaf curl, Orobanche.
2. Groundnut diseases – Collar rot, Tikka leaf spots, rust, pepper leaf spot, stem rot.
3. Groundnut diseases – Bud necrosis, Peanut stem necrosis disease, Kalahasti malady.
4. Sesamum diseases – Phyllody, Alternaria leaf spot, powdery mildew, charcoal rot, bacterial leaf spot.
5. Castor diseases – wilt, root rot, grey mold, bacterial leaf spot, seedling blight, rust.
6. Sunflower diseases – leaf blight, rust, powdery mildew, head rot, collar rot, downy mildew, mosaic, sunflower necrosis virus.
7. Safflower diseases – Alternarialeaf blight, wilt, rust, mosaic.

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

1. Mustard diseases – White rust, downy mildew, powdery mildew, Alternaria leaf spot, Sclerotinia stem rot.
2. Red gram diseases – Phytophthora blight, wilt, sterility mosaic and, bacterial leaf spot and stem canker.
3. Bengal gram diseases – wilt, rust, Ascochyta blight, stem and root rot, grey mold.
4. Black gram and Green gram diseases – Powdery mildew, rust, Cercospora leaf spot, Corynespora leaf spot, Angular black spot, Dry root rot, web blight.
5. Blackgram and Greengram diseases – Bacterial leaf spot, Yellow Mosaic virus, Leaf crinkle, Cuscuta.
6. Soybean diseases – Rhizoctonia blight, seed and seedling rot, rust, Soybean mosaic, Bacterial pustule; Pea diseases - downy mildew, powdery mildew and rust.

7. Cowpea diseases – Cowpea mosaic virus disease.; Lentil diseases - rust and wilt.

References

1. Rangaswami, Gand K.Mahadevan. 2001. Diseases of crop plants in India. Prentice Hall of India Pvt.Ltd, New Delhi.
2. Singh, R.S. 2005. Plant Diseases. Oxford & IBH Publications, New Delhi.

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: V**

Course Title: Diseases of Field Crops & their Management **Course Code: PATH371P**

- I – Practical

No. of Hours: 30 Hrs. **Credits: 1**

Objectives:

- To explain identification and symptoms of diseases
- To explain management of diseases of various crops
- To explain control of diseases by natural methods

Course Outcomes:

CO1: Explain symptoms, identification and histopathological studies of rice, Wheat, Sorghum and Bajra diseases.

CO2: Explain symptoms, identification and histopathological studies of Maize and Finger millet

CO3: Explain symptoms, identification and histopathological studies of Sugarcane and ground nut

EXPERIMENTS:

Study of the symptoms, identification and histopathological studies of the following diseases.

1. Rice diseases **(3hrs)**
2. Wheat, Sorghum and Bajra diseases **(3hrs)**
3. Maize and Finger millet diseases **(3hrs)**
4. Field visits for the diagnosis of crop diseases. **(3hrs)**
5. Sugarcane diseases **(3hrs)**
6. Tobacco diseases 6 Groundnut diseases **(3hrs)**
7. Field visits for the diagnosis of crop diseases. **(3hrs)**
8. Sunflower and Safflower diseases **(3hrs)**
9. Castor and sesamum diseases **(3hrs)**
10. Mustard diseases **(3hrs)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: V**

Course Title: Integrated Pest & Disease Management **Course Code: PATH372**

No. of Hours: 15 Hrs. **Credits: 1**

Objectives

- To manage insects by not only killing them but by preventing feeding, multiplication and dispersal.
- To use ecofriendly methods, which will maintain quality of environment (air, water, wild life and plant life).
- To make maximum use of natural mortality factors, apply control measures only when needed.

Course Outcomes

CO1: Summarize and present Concepts of IPM.

CO2: Discuss the importance of ecological and evolutionary knowledge in IPM success.

CO3: Explain Classification of fungicides based on chemical group and antibiotics.

CO4: Summarize Integrated disease management in important crops & Explain Implementation and impact of IPM (IPM module for Insect pest).

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

1. Integrated disease management – Introduction, concept, Total system approach, Subsystem of IPM, IPM strategies, Integration of practices, Benefits and limitations.
2. Disease triangle, Disease pyramid, Factors affecting disease epidemics, Disease incidence-disease severity, Area under disease progress curve, Descriptive disease scales in important crops with examples. Survey and surveillance of plant diseases: Objectives, methodology and reporting results. Use of Remote sensing technology in Plant Pathology.
3. Plant disease forecasting – meaning – advantages, methods in forecasting, information needed for forecasting, examples of disease forecasting models.
4. Classification of fungicides based on chemical group and antibiotics with examples.

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

1. Methods of disease control: Host plant resistance – advantages– Flor's gene for gene hypothesis – types of resistance – vertical and horizontal resistance – mechanism of resistance. Cultural methods, mechanical methods and physical methods with examples. Biological control – Biocontrol organisms – mechanisms of biocontrol – examples- mass multiplication methods.
2. Integrated disease management in important crops: Rice, Groundnut, Cotton and Chillies 8. Integrated disease management in important crops – Mango, Banana, Citrus and Brinjal.

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

1. Economic importance of insect pests. Pest risk analysis - Calculation and dynamics of economic injury level and importance of Economic threshold level.
2. Methods of detection and diagnosis of insect pests – types of insect damage on crop plants based on the types of mouth parts (biting and chewing, piercing and sucking, lacerating and sucking, siphoning and degenerate types).
3. Ecological management of crop environment - Ecological principles – importance of ecosystem concept – ecological niche – Agro ecosystem components and services in management of crop environment.

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

1. Introduction to conventional and botanical pesticides for the insect pests and disease management.
2. Survey & surveillance and forecasting of Insect pests, Case histories of IPM programmes – success stories. Development and validation of IPM modules for major crops.
3. Problem identification – Research and development of IPMs – Modules for major Agricultural and horticultural crops and validation.

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

1. Implementation and impact of IPM (IPM module for Insect pest) - IPM modules for major field crops (paddy, sugarcane, cotton, pulses and ground nut) major vegetables (brinjal, tomato, okra, cabbage and cauliflower), mango and coconut – Impact studies of IPM modules and constraints in implementation.
2. Political, social and legal implication of IPM - Safety issues in pesticide uses – legislative measures – Awareness about IPM, Farmers participation – Government support.
3. Safety issues in pesticide uses – Pesticide risk assessment, management and

communication, use in agriculture. Environmental impact – health effects – residues, resurgence and resistance – effect on non-target organisms – Strengths and weaknesses of pesticides.

REFERNCES

1. Rangaswami, G & Mahadevan, K.2001. Diseases of crop plants in India, Prentice Hall of India Pvt.Ltd, New Delhi.
2. Singh, R.S.2005. Plant Diseases. Oxford & IBH Publications, New Delhi
3. Pathak, V.N.2001. Diseases of Fruit crops. Oxford & IBH Publications, New Delhi
4. Singh, R.S.1999. Diseases of Vegetable crops. Oxford & IBH Publications, New Delhi
5. Chaube, H.S and V.S. Pundhir, 2012. Crop Diseases & Their Management. PHI Pvt.Ltd, New Delhi

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PRACTICAL SYLLABUS

Subject: Agriculture and Rural Development **Semester: V**

Course Title: Integrated Pest & Disease Management - Practical **Course Code: PATH372P**

No. of Hours: 30 Hrs. **Credits: 1**

Objectives:

- To understand and identify the symptoms of various crop diseases.
- To understand the control of various disease.
- To explain about bio control agents.

Course Outcomes:

CO1: Explain plant diseases based on symptoms and signs

CO2: Discuss biocontrol agents.

CO3: Explain IDM and Non-IDM methods for plant diseases control.

EXPERIMENTS:

1. Identification of plant diseases based on symptoms and signs. **(4hrs)**
2. Laboratory methods used in the diagnosis of Plant diseases. **(4hrs)**
3. Methods of measurement of plant diseases, descriptive disease scales for important diseases. Plotting AUDP curves. **(4hrs)**
4. Methods to assess crop yield losses due to crop diseases with examples. **(4hrs)**
5. Identification of disease biocontrol agents – Trichoderma, Pseudomonas, Bacillus spp. – Laboratory isolation procedures. **(4hrs)**
6. Mass multiplication of biocontrol agents: Trichoderma and Pseudomonas. **(3hrs)**
7. Crop monitoring for assessment disease dynamics – Decision making. **(4hrs)**
8. IDM and non-IDM methods – Cost benefit analysis – Case studies. **(3hrs)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: V**

Course Title: Rural Industrialization & Entrepreneurship **Course Code: RERD303**

No. of Hours: 30 Hrs. **Credits: 2**

Objectives

- To enable the students to understand nature of Industrialisation.
- To make familiar the students about rural development process.
- To enrich the students about Industrial Labour.

Course Outcomes

CO1: Discuss Rural Industrialisation 14 Hours Concept, Need and Importance.

CO2: Explain Growth of Rural Industries in India – Gandhian Approach and Modern Approach.

CO3: Identify Problems and Remedies of Rural Industrialisation.

CO4: Examine Growth and Structure of Rural Industries, Current Status, Measures to Sustain Growth, Sickness – Remedial Measures and Outline the Definition, Role and Present Position.

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

Rural Industrialisation 14 Hours Concept, Need and Importance - Growth of Rural Industries in India – Gandhian Approach and Modern Approach-Problems and Remedies of Rural Industrialisation.

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

Rural Industries in India 14 Hours Growth and Structure of Rural Industries, Current Status, Measures to Sustain Growth, Sickness – Remedial Measures.

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

Small Scale and Cottage Industries in Rural India 10 Hours Meaning, Definition, Role, Present Position, MSME – Industrial Policies and Programmes, Problems – KVIC and its Role.

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

Rural Industrial Financing 12 Hours Sources of Credit - Institutional and Non –Institutional - Role of Commercial Banks, Co-operatives, Gramina Banks and NABARD.

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

Rural Industrial Labour 10 Hours Meaning, Importance, Types - Organized and Unorganized Rural Industrial Labour – Rural Industrial Labour Problems - Labour Turn Over – Migration.

References

1. Vasant Desai: Rural Development in India, Himalaya Publishing House, Mumbai, 2012.
2. Dutt and Sundaram- Indian Economy, S.Chand Publications, New Delhi, 2013-07-02.
3. S.K. Mishra and V.K. Puri- Economics of Development and Planning, Himalaya Publishing House, Mumbai, 2012.

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: VI**

Course Title: Rain Fed Agriculture & Watershed Management **Course Code: AGRO303**

No. of Hours: 30 Hrs. **Credits: 2**

Objectives

- To learn basic knowledge of rain fed agriculture and water shed management.
- To Study the crop adaptation and mitigation strategies, crop planning and crop management techniques.
- To increase / stabilize production of crops, forage, fruits, fuel and timber in rainfed areas.

Course Outcomes

CO1: Understand about rainfed agriculture and its introduction, problem and prospects in India.

CO2: Describe farming practices that rely on rainfall for water.

CO3: Understand objective, principles and component of watershed management.

CO4: Explain conservation of soil by adopting latest soil conservation techniques will help in obtaining higher production of Rainfed crops and Introduction of improved soil and moisture conservation.

UNIT-

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- mechanism of crop adaptation under moisture deficit condition - management strategies for drought.

UNIT-II (6 Hrs.)

1. Tillage for rainfed crops – off-season tillage – primary tillage –secondary tillage – year-round tillage – sub soiling – setline cultivation – modern concepts of tillage- minimum tillage and zero tillage.
2. 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.
3. Management of crops in rainfed areas - Agronomic measures of soil and water conservation – choice of crop – crop geometry – tillage – contour cultivation – strip cropping – cover cropping – mulching – cropping systems and weed control - Mechanical measures of soil and water management.

UNIT-III (6 Hrs.)

1. Watershed – definition – concept— objectives and principles of water shed management components of watershed development programme – factors affecting watershed management.
2. Water harvesting – importance, its techniques- Water harvesting structures – arid region – runoff farming – water spreading – micro catchments – semi arid region – farm ponds, check dams – percolation tank – dug wells – life saving irrigation.
3. 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 (6 Hrs.)

1. Fertilizer use in rainfed areas – use of organic manures – introduction of legumes in crop rotation– organic recycling and bio-fertilizer use in rainfed agriculture – time and method of fertilizer application.
2. Efficient crops and varieties – cropping systems in rainfed areas – intercropping – advantages – efficient inter cropping systems in different rainfed regions of Andhra Pradesh.
3. Contingent crop planning for aberrant weather conditions in red and black soils.

UNIT-V (6 Hrs.)

1. Evapotranspiration – measures to reduce evapotranspiration – weeding, use of mulches, chemicals, windbreaks and shelterbelts.
2. Land capability classification – alternate land use system.

3. Efficient utilization of water through soil and crop management practices - agronomic measures - mechanical measures for soil and water conservation – gully control – bench terraces – contour terracing – graded bund.

References

1. Reddy, S. R. and Prabhakar Reddy, G. 2015. Dryland Agriculture. Kalyani Publishers.
2. Arnon,I. 1972. Crop Production in Dry Regions (Vol.I), Leonard Hill Pub. Co, London.
3. Dhruva Narayana, V.V., Sastry, G.S. and Patnaiak, V.S. 1999. Watershed Management in India. ICAR, New Delhi.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural development **Semester: VI**

Course Title: Rain fed Agriculture & Watershed Management -Practical **Course Code: AGRO303P**

No. of Hours: 30 Hrs. **Credits: 1**

Objectives:

- To understand climatic classification
- To understand the monsoons and cropping pattern
- To explain rainfall and calculation of wet spells, dry spells

Course Outcomes:

CO1: Discuss climatic classification, rainfall analysis

CO2: Explain onset and withdrawal of monsoons and cropping pattern for different areas

CO3: Outline meteorological data for rainfall variability

EXPERIMENTS:

1. Climate classification. **(4Hrs.)**
2. Rainfall analysis - Mean, standard deviation, variance and CV. **(4Hrs.)**
3. Onset and withdrawal of monsoons and determination of length of growing crop season. **(4Hrs.)**
4. Study on cropping pattern of different dryland areas. **(4Hrs.)**
5. Mapping of dryland areas in India. **(4Hrs.)**
6. Interpretation of meteorological data for rainfall variability. **(4Hrs.)**
7. Scheduling of supplemental irrigation based on crop ET demand. **(4Hrs.)**
8. Critical analysis of rainfall and calculation of wet spells,dry spells ,and length of growing season. **(4Hrs.)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development | **Semester: VI**

Course Title: Agriculture Informatics | **Course Code: SMCA301**

No. of Hours: 15 Hrs. | **Credits: 1**

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.)**

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.
3. 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.

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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.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: VI**

Course Title: Agriculture Informatics-Practical **Course Code: SMCA301P**

No. of Hours: 30 Hrs. **Credits: 1**

Objectives:

- To understand basics of computer
- To explain notepad, MS word
- To understand MS Excel

Course Outcomes:

CO1: Explain the basics of computer and tool bars.

CO2: Discuss Notepad, MS word and Excel.

CO3: Explain creating a table, Merging of cells, columns and row width Formats.

EXPERIMENTS:

1. Booting of computer and it's shut down - Practicing Windows operating system - Use of mouse -Title bar – Minimum, maximum and close buttons - Scroll bars - Menus and tool bars. **(4Hrs.)**
2. Windows explorer- Creating folder - Copy and paste functions - Control panel Notepad -WordPad etc. **(4Hrs.)**
3. MS word - Creating a document, saving and editing. **(4Hrs.)**
4. Use of options from tool bars – Format - Insert and tools (Spelling and Grammar) - Alignment of paragraphs and text. **(4Hrs.)**
5. Creating a table - Merging of cells - columns and row width - Formats etc. **(4Hrs.)**
6. MS- Excel - Creating a spreadsheet - Alignment of rows - columns and cells using format tool bar. **(4Hrs.)**
7. Entering formula expression through formula tool bar and use of in-built functions Sum – Average – Stdev –Maximum and minimum. **(3Hrs.)**
8. Data analysis using inbuilt tool packs test of significance. **(3Hrs.)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Agriculture & Rural Development **Semester: VI**

Course Title: Crop Improvement-II & Seed Technology **Course Code: GPBR312**

No. of Hours: 30 Hrs. **Credits: 2**

Objectives

- To understand improved varieties are developed through plant breeding.
- To observe the improve yield, quality, disease-resistance, drought.
- To discuss frost-tolerance and important characteristics of the crops.

Course Outcomes

CO1: Explain origin, distribution and different breeding methods.

CO2: Discuss adopted for the development of varieties / hybrids in various field and horticultural crops.

CO3: Explain about the plant genetic resources, centres of diversity and breeding for resistance to biotic and abiotic stresses.

CO4: Learn about the procedure of production of hybrid seed in different crops.

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

1. Introduction – General breeding objectives – Concepts of breeding self-pollinated, cross pollinated and vegetatively propagated crops - Breeding populations relevance in crop improvement.
2. Fibres - Cotton and Jute- 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. Sugars and starches – Sugarcane - 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. Sugars and starches – Potato and sweet potato - 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 **(6 Hrs.)**

1. Narcotics - Tobacco- 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. Vegetables - Tomato and Brinjal - 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. Vegetables - Chilli and Okra - 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 **(6 Hrs.)**

1. Vegetables-Cucumber, Cabbage and cauliflower - 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. Vegetables - Garlic and Onion - 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. Vegetables - Gourds and Melons- 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 **(6 Hrs.)**

1. Fruit crops - Banana and Guava - 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. Fruit Crops-Mango and Papaya - 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. Fruit crops - Lime, Lemons and Apple - 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 **(6 Hrs.)**

1. Fruit crops - Pomegranate and Sapota - 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. Flower crops - Rose and Jasmine - 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. Flower crops - Chrysanthemum and Marigold - 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.

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1. Allard, R.W. 1960. Principles of Plant Breeding. John Wiley & Sons, New York.
2. Phundan Singh. 2006. Essential of Plant Breeding. Kalyani Publishers, Ludhiana.
3. Poehlman, J.M. and Borthakur, D. 1995. Breeding of Asian Field Crops. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
4. Sharma, J.R. 1994. Principles and Practice of Plant Breeding. Tata McGraw-Hill Publishing Co. Ltd., New Delhi.
5. Kalloo, G.1994. Vegetable Breeding. Panima Educational Book Agency, New Delhi.
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MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: VI**

Course Title: Crop Improvement-II & Seed Technology -Practical **Course Code: GPBR312P**

No. of Hours: 30 Hrs. **Credits: 1**

Objectives:

- To explain hybridization techniques.
- To understand floral morphology.
- To explain pollination, selfing, emasculation and crossing techniques in Fruit crops.

Course Outcomes:

CO1: Explain Hybridization techniques and precautions to be taken - Floral morphology, selfing, emasculation and crossing techniques in field crops.

CO2: Summarise floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in field crops.

CO3: Explain floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in vegetables.

EXPERIMENTS:

1. Hybridization techniques and precautions to be taken - Floral morphology, selfing, emasculation and crossing techniques in field crops. **(4Hrs.)**
2. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Cotton and Jute. **(4Hrs.)**
3. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Sugarcane and Tobacco. **(4Hrs.)**
4. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Tomato and Brinjal. **(3Hrs.)**
5. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Chilli and Okra. 6. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in and Cucumber, Cabbage and Cauliflower. **(3Hrs.)**
6. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Garlic and Onion. **(3Hrs.)**
7. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Bitter gourd and Water melon. **(3Hrs.)**

8. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Banana and Mango. **(3Hrs.)**
9. Floral biology, anthesis, pollination, selfing, emasculation and crossing techniques in Papaya and Guava. **(3Hrs.)**

SCHEME OF EVALUATION:

S. No.	Experiment	Marks (50)
01	Major Experiment	15Marks
02	Minor Experiment	10Marks
03	Viva	10Marks
04	Record	10Marks
05	Skills	05Marks

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

SYLLUBUS

Subject: Agriculture & Rural Development **Semester: VI**

Course Title: Pest of Horticultural Crops & Beneficial Insects **Course Code: ENTO332**

No. of Hours: 30 Hrs. **Credits: 2**

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.

CO2: Explain Seasonal abundance and their management.

CO3: Discuss minor pests their taxonomic position, nature and symptoms of damage.

CO4: Explain Management have been covered with additional information wherever necessary.

UNIT-I **(6 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 **(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 **(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, chop sticks, rubber foam, ant well, mountages, chopping knife, chopping board, feeding basins, disinfection and hygiene in rearing house.

UNIT-IV **(6 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 **(6 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.

References

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2. Butani, D.K. and Jotwani, M.G. 1984. Insects in Vegetables. Periodical Export Book Agency, New Delhi.
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MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: VI**

Course Title: Pest of Horticultural Crops & Beneficial Insects- Practical **Course Code: ENTO332P**

No. of Hours: 30 Hrs. **Credits: 1**

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 **(4Hrs.)**
2. Identification of insect pests of Cruciferous and Cucurbitacious vegetables and their damage symptoms **(4Hrs.)**
3. Identification of insect pests of leafy vegetables, potato, sweet potato, moringa and chilli and their damage symptoms (Potato and Chillies are Solanaceous crops). **(4Hrs.)**
4. Identification of insect pests of mango, cashew, citrus & banana and their damage symptoms. **(3Hrs.)**
5. Identification of insect pests of grapevine, pomegranate, sapota, papaya, apple, custard apple, ber and guava and their damage symptoms. **(3Hrs.)**
6. Identification of insect pests of coconut, arecanut, cocoa, cardamom, pepper, date palm & oil palm, eucalyptus and neem and their damage symptoms. **(3Hrs.)**

7. Identification of insect pests of spices, narcotics (turmeric, betel vine, onion, tobacco & ginger) and ornamental plants (jasmine, rose, chrysanthemum) and their damage symptoms. **(3Hrs.)**
8. Identification of economically important mite, nematode (vegetables, citrus, banana and coconut), rodent (coconut) and bird pests of horticultural crops and their management. **(3Hrs.)**
9. Acquaintance with silkworm species and small-scale rearing of mulberry silkworm. **(3Hrs.)**

SCHEME OF EVALUATION:

S. No.	Experiment	Marks (50)
01	Major Experiment	15Marks
02	Minor Experiment	10Marks
03	Viva	10Marks
04	Record	10Marks
05	Skills	05Marks

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: VI**

Course Title: Diseases of Horticultural Crops and their management-II **Course Code: PATH373**

No. of Hours: 15 Hrs. **Credits: 1**

Objectives

- To explain citrus diseases.
- To discuss Mango diseases.
- To identify Ber, guava and sapota diseases.

Course Outcomes

CO1: Explain Guava, Papaya, Ber and Sapota diseases

CO2: Discuss Citrus, Guava, Papaya, Ber and Sapota diseases

CO3: Explain Banana diseases

CO4: Summarize Pomegranate diseases and vegetables diseases

UNIT-I **(3 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), felt, tristeza and greening.
3. Mango diseases:anthracnose, malformation, bacterial leaf spot,powder mildew, sooty mold, red rust and Loranthus.
3. Guava, Papaya, Ber and Sapota diseases –Guava: wilt and anthracnose.Papaya: foot rot, anthracnose, leaf curl and mosaic and powdery mildew.Ber: Powdery mildew. Sapota: Flat limb.
4. Banana and Pomegranate diseases –Banana: Panama wilt, bacterial wilt, Erwinia rhizome rot, Sigatoka,bunchy top, banana mosaic and banana bract mosaic. Pomegranate: Anthracnose and bacterial blight.

UNIT-II **(3 Hrs.)**

1. Grapevine diseases – downy mildew, Powdery mildew, anthracnose, Alternaria leaf spot and rust.
2. Apple and Peach diseases –Apple: scab, powdery mildew, fire blight and crown gall

Peach: leaf curl.

3. Chillies diseases - Damping off, die-back and fruit rot, Fusarium wilt, powdery mildew, Choanephora blight,Cercospora leaf spot, bacterial leaf spot, mosaic complex and leaf curl.

UNIT-III **(3 Hrs.)**

1. Brinjal and Okra diseases –Brinjal- Phomopsis blight and fruit rot, bacterial wilt and little leaf. Okra-Cercospora leaf spot, powdery mildew and Yellow Vein Mosaic.
2. Potato diseases - early and late blight, black scurf, common scab, wart, black leg, brown rot, leaf roll, mosaics, potato spindle tuber.
3. Tomato diseases - damping off, Ralstonia wilt, early blight, buck eye rot and leaf curl, Septoria leaf spot, bacterial canker, root knot, Tomato spotted wilt and mosaic.

UNIT-IV **(3 Hrs.)**

1. Crucifers and Cucurbits diseases –Cruciferous vegetables- Club root, white rust, Downy mildew, powdery mildew, Alternaria leaf spot and black rot. Cucurbits: downy mildew, powdery mildew, Cercospora leaf spot, Erwinia wilt and CMV.
2. Betelvine, onion and garlic diseases –Betelvine: Phytophthora root and stem rot, Sclerotial wilt, Fusarial wilt, Anthracnose. Onion and garlic: Smudge, smut, purple blotch, and Stemphylium blight.
3. Beans, Colocasia and Coriander diseases –Beans- anthracnose, rust, Bean common mosaic virus and bacterial blight. Colocasia: Phytophthora blight. Coriander- stem gall.

UNIT-V **(3 Hrs.)**

1. Coconut and oil palm diseases –Coconut- Stem bleeding, Ganoderma wilt, bud rot, grey blight 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, rhizome rot Ginger: rhizome rot/soft rot, leaf spot. Mulberry - powdery mildew.
3. Rose- dieback, powdery mildew and black leaf spot. Marigold: Botrytis blight Chrysanthemum- wilt, stunt, Septoria blotch. Jasmine- rust. Crossandra – wilt.

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MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: VI**

Course Title: Diseases of Horticultural Crops and their Management-II – Practical **Course Code: PATH373P**

No. of Hours: 30 Hrs. **Credits: 1**

Objectives:

- To explain identification and symptoms of various diseases in fruits crops.
- To explain identification and symptoms of various diseases in vegetable crops.
- To discuss management of diseases in fruits and vegetables.

Course Outcomes:

CO1: Explain symptoms, Identification and histopathological studies of citrus and mango.

CO2: Explain symptoms, Identification and histopathological studies of Ber, guava and sapota diseases.

CO3: Discuss symptoms, Identification and histopathological studies of Papaya, banana and pomegranate diseases.

EXPERIMENTS:

Studies of symptoms, Identification and histopathological studies of the following diseases

1. Citrus diseases. **(4Hrs.)**
2. Mango diseases. **(4Hrs.)**
3. Ber, guava and sapota diseases. **(4Hrs.)**
4. Field visits for the diagnosis of crop diseases. **(3Hrs.)**
5. Papaya, banana and pomegranate diseases. **(3Hrs.)**
6. Grape and Apple diseases. **(3Hrs.)**
7. Chilli, brijnal and Bhendi diseases. **(3Hrs.)**
8. Field visits for the diagnosis of crop diseases. **(3Hrs.)**
9. Potato and tomato diseases **(3Hrs.)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Agriculture & Rural Development **Semester: VI**

Course Title: Post-harvest Management of Fruits and Vegetables **Course Code: HORT381**

No. of Hours: 15 Hrs. **Credits: 1**

Objectives

- To examine various management technologies on pre- harvest and post-harvest of fruits and vegetables.
- To identify conventional and modern packaging methods and the importance of post-harvest technology of horticultural crops.
- To explain maturity indices, harvesting and post-harvest handling of fruits and vegetables and discuss maturity and ripening process.

Course Outcomes

CO1: Explain Various methods of packaging materials and transport, Packaging technology.

CO2: Discuss various Methods of storageprecooling, pre storage treatments, low temperature storage, controlled atmosphere storage.

CO3: Explain Chemicals used in Ripening.

CO4: Summarize Irradiation and lowcost storage structures.

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

1. Scope and Importance of post-harvest technology of fruits and vegetables- Extent and possible causes of post-harvest losses- Causes of postharvest losses.
2. Pre-harvest factors affecting postharvest quality, maturity, ripening and shelf life of fruits and vegetables – Environmental factors (Temperature, Light, Rainfall, Wind, Relative humidity) – Cultural factors – (Rootstock, Variety, Mineral nutrients, growth regulators, irrigation, pruning, thinning, girdling) – Maturity – Pest and diseases.
3. Changes occurring during ripening – Ripening definition- Climacteric and non-climacteric fruits – Metabolic changes - Maturation of seeds – Colour – Texture - Changes in carbohydrates- Changes in aromatic volatiles - Changes in organic acids – Fruit abscission – Changes in respiration rate – Development of surface waxes – Changes in tissue permeability.

4. Causes for deterioration of harvested fruits and Vegetables -Respiration and factors affecting respiration rate – Transpiration and factors affecting transpiration - Ethylene – Mechanical damage – Pest and Diseases.

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

1. Postharvest diseases and disorders - Heat, chilling and freezing injury.
2. Harvesting and field handling – Methods of harvesting – Post harvest handling – Pre-cooling - Sorting and grading – Disinfestation – Post harvest treatments (Waxing, Wrapping, de-greening, ripening).
3. Storage – Methods of storage – Traditional storages (In-situ, pit storage, high altitude, clamp storage, wind breaks, cellars, barns, Night ventilation, Evaporative cool storage ZECC) - Improved storage methods (Refrigerated storage, modified atmospheric storage, controlled atmospheric storage, hypobaric storage).

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

1. Value addition – Concept – Scope and importance of fruit preservation in India – Status of fruit preservation in India.
2. Principles and methods of preservation – Principles of preservation – Preservation methods – High temperature, low temperature, drying, filtration, chemicals, food additives, fermentation, carbonation, antibiotics, irradiation etc.
3. Intermediate moisture foods - Jam, jelly, marmalade – Problems in Jam makingimportant considerations and problems in Jelly making- Problems in marmalade making.

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

1. Preserve, candy – Concepts and Standards – Flow chart for manufacturing of preserve and candy – Problems in preservation of preserve and candied fruits – Glazed fruits/vegetables.
2. Fruit beverages –Fermented (Juices, Ready to serve, Nectar, cordial, Squash, crush, Syrup, Fruit Juice concentrate, Fruit Juice, Powder, Carbonated beverages) and non-fermented beverages (Wine, Champagne, Port, Sherry, Tokay, Muscat, Perry, Nira, Feni, Cider) – Preparation and preservation of unfermented fruit beverages.
3. Tomato processing - Concepts and Standards – Tomato juice – Tomato puree and paste – Tomato sauce/ketchup- Tomato chutney/pickle –Tomato cocktail – Tomato soup – Canned tomatoes.

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

1. Drying/dehydration of fruits and vegetables – Factors affect the rate of drying – Advantages of dehydration over sun drying – Process of drying/dehydration of fruits and vegetables – Spoilage of dried fruits and vegetables - Freezing – Methods of freezing.

2. Canning of fruits and vegetables – Selection of fruits and vegetable - Causes of spoilage of canned foods – Testing for defects - Containers for packing of canned products – Tin containers, glass containers.
3. 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.

References

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3. Giridharilal, G.S., Siddappa and Tondon, G.L. 2007. Preservation of Fruits and Vegetables. ICAR, New Delhi.
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MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: VI**

Course Title: Post-harvest Management of Fruits & Vegetables-Practical **Course Code: HORT381P**

No. of Hours: 30 Hrs. **Credits: 1**

Objectives:

- Explain postharvest techniques and processing
- Explain preparation of Jam, jellies
- Explain preparation of RTS

Course Outcomes:

CO1: Explain different types of packaging containers for shelf-life extension.

CO2: Explain preparation of jams and jelly.

CO3: Discuss preparation of RTS.

EXPERIMENTS:

1. Applications of different types of packaging containers for shelf-life extension. **(4Hrs.)**
2. Effect of temperature on shelf life and quality of produce. **(4Hrs.)**
3. Demonstration of chilling and freezing injury in vegetables and fruits. **(4 Hrs.)**
4. Extraction and preservation of pulps and juices. **(4Hrs.)**
5. Preparation of jam. **(3Hrs.)**
6. Preparation of jelly. **(3Hrs.)**
7. Preparation of RTS. **(3Hrs.)**
8. Preparation of nectar. **(3Hrs.)**
9. Preparation of squash. **(3Hrs.)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Agriculture & Rural Development **Semester: VI**

Course Title: Communication & Personality Development **Course Code: AEXT391**

No. of Hours: 15 Hrs. **Credits: 1**

Objectives

- To develop effective communication skills (spoken and written).
- To become self-confident individuals by mastering inter-personnel.
- To enhance skills, team management skills, and leadership skills.

Course Outcomes

CO1: Explain Nonverbal communication skills - Practicing conscious body postures and movements.

CO2: Overview of verbal communication skills.

CO3: Learn practicing listening and note taking and writing skills.

CO4: Practicing oral presentation skills & Practicing writing of field diary and lab record - Indexing, footnote and bibliographic procedures.

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

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 **(6Hrs.)**

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 **(6Hrs.)**

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 **(6Hrs.)**

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 **(6Hrs.)**

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.

References

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MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: VI**

Course Title: Communication & Personality Development - Practical **Course code: AEXT391P**

No. of Hours: 30 Hrs. **Credits: 1**

Objectives:

- To explain verbal communication skills
- To understand listening and note taking and writing skills
- To understand and practicing oral presentation skills

Course Outcomes:

CO1: Explain communication and nonverbal communication skills

CO2: Explain verbal communication skills

CO3: Discuss oral communication skills

PRACTICALS:

1. Communication - Meaning and process of communication. **(4Hrs.)**
2. Overview of nonverbal communication skills, signs of body language. **(4Hrs.)**
3. Nonverbal communication skills - Practicing conscious body postures and movements. **(4Hrs.)**
4. Overview of verbal communication skills. **(4Hrs.)**
5. Practicing listening and note taking and writing skills. **(4Hrs.)**
6. Practicing oral presentation skills. **(4Hrs.)**
7. Practicing writing of field diary and lab record - Indexing, footnote and bibliographic procedures. **(3Hrs.)**
8. Practicing reading and comprehension of general and technical articles. **(3Hrs.)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: VI**

Course Title: Farm Management & Resource Economics **Course Code: AECO341**

No. of Hours: 15 Hrs. **Credits: 1**

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 theory of firm 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.

UNIT-I **(6 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 **(6 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 equimarginal returns/ principles of opportunity cost, decision rules.

UNIT-III **(6 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 **(6 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 **(6 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.

References

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MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural development **Semester: VI**

Course Title: Farm Management & Resource Economics -Practical **Course Code: AECO341P**

No. of Hours: 30 Hrs. **Credits: 1**

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 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 most profitable enterprise combination. **(5Hrs.)**
6. Farm holding surveys. **(5Hrs.)**

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SYLLABUS

Subject: Agriculture & Rural Development **Semester: VI**

Course Title: Agriculture Microbiology **Course Code: AMBE373**

No. of Hours: 15 Hrs. **Credits: 1**

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

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MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: VI**

Course Title: Agricultural Microbiology-Practical **Course Code: AMBE373P**

No. of Hours: 30 Hrs. **Credits: 1**

Objectives:

- To understand introduction to microbiology
- To understand and explain about lab experiments
- To understand methods of sterilization

Course outcomes:

CO1: Explain microbiology and equipments.

CO2: Summarise methods of sterilization.

CO3: Explain staining and microscopic examination of biofertilizer organism.

EXPERIMENTS:

1. Introduction to microbiology laboratory and its equipments. **(4Hrs.)**
2. Microscope- Parts, principles of microscopy, resolving power and numerical aperture. **(4Hrs.)**
3. Micrometry-Measurement of size of microorganisms. **(4Hrs.)**
4. Methods of sterilization. **(3Hrs.)**
5. Bacterial staining procedures-Simple staining - Gram's staining and Endospore staining. **(3Hrs.)**
6. Nutritional media and their preparations. **(3Hrs.)**
7. Enumeration of microbial population in soil- Bacteria, fungi and actinomycetes. **(3Hrs.)**
8. Methods of isolation purification and maintenance of microbial cultures. **(3Hrs.)**
9. Isolation of Rhizobium from legume root nodule. **(3Hrs.)**

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Agriculture & Rural Development **Semester: VI**

Course Title: Fundamentals of Plant Biotechnology **Course Code: BICM302**

No. of Hours: 15 Hrs. **Credits: 1**

Objectives

- To understand the basics of Plant Biotechnology.
- To study various techniques used in Plant Tissue Culture.
- To give students new knowledge by handling of classical and modern plant biotechnology processes, understanding of biotechnological processes has also applicative value in pharmaceutical and food industry, in agriculture and in ecology.

Course Outcomes

CO1: Assist in micro propagation units

CO2: Determine the structures of proteins.

CO3: Determine the structures and functions of RNA and DNA.

CO4: Explain about enzyme activity.

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

1. Introduction – Historical aspects of Biochemistry– Scope, impact and importance of Biochemistry in plant sciences -Properties of water – PH – Buffers. 171.
2. Carbohydrates– Classification - Structures – Monosacharides – Structural aspects – mutarotation - Reducing and oxidizing properties.
3. Oligosaccharides and polysaccharides-Funtions of carbohydrates.
4. Lipids – Fatty acids – Structures and properties – Functions of lipids.
5. Lipids - Classification – Storage lipids and membrane lipids – Saponification, hydrogenation, Iodine number and Acid value.
6. Amino acids – Structures - Classification – Zwitterions – Titration.
7. Peptides – Oligopeptides – Cyclic and acyclic peptides – Malformin, Glutathione, Gramicidin – Functions of peptide.

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

1. Proteins –Importance - Classification - Properties of proteins –Isoelectric PH – Denaturation - Protein sequencing – Edman degradation method.
2. 9 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 – Mechanism of enzyme action.
4. Classification of enzymes - Isoenzymes – Multienzyme complex – Allosteric enzymes and coenzymes.
5. Measurement of enzyme activity – Factors effecting enzyme activity – Enzyme Inhibition – MM & LB plots.
6. Nucleic acids – Functions – Structures of nitrogen bases – Nucleosides – Nucleotides in RNA and DNA.

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

1. Various types of DNA and RNA – Secondary structure of B-DNA and t-RNA.
2. Metabolism – Anabolism and Catabolism – Stages of respiration – Overall metabolic view of carbohydrates, proteins and lipids.
3. Metabolism of carbohydrates – Glycolysis – Aerobic and anaerobic.
4. Tricarboxylic Acid (TCA) cycle— Glyoxalate cycle – Electron transport chain.
5. Metabolism of lipids –Biosynthesis of fatty acids and tri acyl glycerol
6. Catabolism of lipids α, β & γ oxidation of fatty acids in brief and α oxidation in detail.

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

1. Protein Biosynthesis and post translational modifications
2. Secondary metabolites – Terpenoids – Alkaloids - Phenolics – Importance
3. Biotechnology – Major – Concepts and importance – Applications of plant biotechnology.
4. Introduction to plant tissue culture – History – Scientists - Terminology – Steps in general tissue culture – Types of sterilization and nutrient media – Types of cultures – Organ cultures, cell suspension culture, callus culture, pollen culture and their applications.
5. Micro propagation – Procedure techniques – Organogenesis and embryogenesis – Problems – Advantages – Limitations. 172
6. Anther culture – embryo culture – Ovule culture – Somatic embryogenesis - Synthetic seeds and its applications.

UNIT-V (6 Hrs.)

1. Protoplast isolation and fusion – Somatic hybridization – Cybrids – Somaclonal variations and applications in crop improvement – Cryo preservation
2. Recombinant DNA methods - Introduction to genetic engineering – Definitions – Gene cloning - Vectors.
3. Gene transfer methods – Indirect methods (Agrobacterium) and direct methods (physical-gene gun method; chemical-PEG mediated and other methods) with case studies / examples.
4. Transgenic plants – Present status - Applications in crop improvement – Limitations – biotechnology regulations.
5. Polymerase chain reaction (PCR) – Procedure and applications.
6. Markers - Morphological, biochemical and molecular markers – RFLP, RAPD and SSR – Marker assisted selection for crop improvement.

References

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.
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MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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PRACTICAL SYLLABUS

Subject: Agriculture & Rural Development **Semester: VI**

Course Title: Fundamentals of Plant Biotechnology - Practical **Course Code: BICM302P**

No. of Hours: 30 Hrs. **Credits: 1**

Objectives:

- To familiarize the students with the key developments in the sphere of Plant Biotechnology.
- To Train students with the techniques associated with the invitro propagation of plants and their maintenance.
- To Create awareness on the importance of plant diversity and its conservation both insitu and exsitu.

Couse Outcomes:

CO1: Identify plant diversity and their conservation through invitro propagation and maintenance of plant tissue culture laboratory.

CO2: Discuss the widely exploited techniques in molecular biology like isolation of plant genomic DNA, their separation by gel electrophoresis, amplification of separated DNA by polymerase chain reaction, construction of phylogenetic trees to study genetic relatedness, construction of genome maps using markers.

CO3: Explain genetic engineering techniques and the importance of using GMOs as bioreactors for the inexpensive production of pharmaceuticals and nutraceuticals.

EXPERIMENTS:

1. Organization of Plant Tissue Culture Laboratory. **(3Hrs.)**
2. Approaches for Sterilization. **(3Hrs.)**
3. Preparation of stock solutions of MS nutrient medium. **(3Hrs.)**
4. Preparation of MS medium and its sterilization. **(3Hrs.)**
5. Inoculation of Explants into the sterilized media. **(3Hrs.)**
6. Isolation of Plant Genomic DNA and its spectrophotometric quantification. **(3Hrs.)**

7. Demonstration of Agarose gel electrophoresis technique. **(3Hrs.)**

8. Demonstration of PCR technique. **(3Hrs.)**

9. Separation of DNA by Agarose gel electrophoresis. **(2Hrs.)**

10. Study of the parts and functions of different equipments used in Biotechnology. **(2Hrs.)**

11. Visit to high tech poly house for a study of factors contributing to plant growth. **(2Hrs.)**

SCHEME OF EVALUATION:

S. No.	Experiment	Marks (50)
01	Major Experiment	15Marks
02	Minor Experiment	10Marks
03	Viva	10Marks
04	Record	10Marks
05	Skills	05Marks