Syllabus of various courses offered for the DASc programme

I. AGRONOMY

1. DAgri.01. Principles and practices of Agronomy –I (2+1)

Agriculture definition – branches of agriculture – Agri. technology development in India. Agronomy -definition – agronomic classification of crops and their importance – major crops in Kerala and India .Meteorology –Agrl. meteorology- definition–weather and climate and its role in crop production. Atmosphere – composition — global warming and climate change-weather forecasting. Meteorological observatory and instruments-lay out of Agro met observatory. Agricultural seasons and monsoons-*Njattuvela* - drought – types of drought – disaster management –mitigation .Elements of crop production – factors affecting crop production- -crop yield contributing characters-biological and economic yield- harvest index. Tillage and tilth – characteristics of good tilth — types of tillage-primary and secondary-tillage implements. Seeds and sowing – seed definition – methods of sowing - seed drills and other implements - transplanting .Vegetative propagation of field crops –spacing - planting geometry. Soil fertility vs soil productivity –organic manures – bio-fertilizers – green manures - forms of fertilizers-time and methods of application. Calculation of fertilizers for important crops – methods to improve FUE .Weeds – definition – classification –noxious and parasitic weeds. Crop – weed association and competition - critical stages of crop weed competition. Weed management — methods of weed control – mechanical- cultural- biological- chemical and IWM. Herbicides – classification – mode of action – selectivity. Formulations - application of herbicides and their fate in soil- plant and water. Weed management in rice-coconut – banana – vegetables – oil seeds and plantations. Weed management in other crops. Rainfed agriculture - dry farming- dry land farming –moisture conservation measures. Irrigated agriculture - irrigation-definition- objectives- soil moisture constants- Field capacity- Permanent Wilting Point- Available Water. Scheduling of irrigation- IW/CPE ratio-Evapo-transpiration- Potential Evaporation- Crop Co-Efficient-etc. Water management of major crops - critical stages - depth of irrigation. Methods of irrigation- surface - subsurface. Micro irrigation-sprinkler- drip- bubbler-pivot irrigation –fertigation. Drainage and its importance in crop production. Different methods of drainage. Cropping pattern - terms and definition - multiple cropping and various forms of inter cropping- sequential cropping- crop rotation- catch cropping and cover cropping- strip cropping- nurse cropping- trap cropping. Cropping systems in various parts of Kerala- multi-tier cropping system - crop cafeteria - multiple cropping. Rice based cropping systems. Important cropping systems in India. Farming system –components -livestock- poultry- aqua culture -duck- pig etc. Integrated farming systems in Kerala .Agro climatic classification of Kerala .

Practical

Visit to Agromet observatory – taking observations - lay out of observatory. Measurement of air and soil temperature – evaporation - Stevenson screen .Land preparations –raised beds and channels – ridges and furrows – contour. Seed bed preparation – different tilth .Practicing different methods of sowing -drilling- dibbling and broadcasting. Calculation of fertilizers for major crops. Preparation of fertilizer mixtures. Liquid fertilizers and foliar application of fertilizers. Identification of weeds – wetland and garden land. Identification of dry land weeds- noxious weeds- waste land weeds. Techniques of weed collection and preservation .Survey of weeds in crop fields-rice- coconut- banana- vegetables. Hand weeding

and mechanical (cono) weeding in rice. Herbicides – formulations- calculation and spraying techniques. Determination of infiltration rate and Field experience with different methods of irrigation. Preparation of cropping scheme for irrigated and dryland situations.

2. DAgri.02 Principles and practices of Agronomy-II (1+1)

Soil erosion-definition- nature and extent of erosion- types of erosion-splash- sheet - rill- gully and landslides. Soil and water conservation-agronomic measures. Mechanical measures of soil conservation. Water harvesting techniques. Sustainable Agriculture-concept and themes- environmental health- profitability - strategies for realizing sustainable agriculture- low and high input agriculture .Alternate agricultural systems-biodynamic farming -natural farming- permaculture- organic farming and other systems. Organic farming-tools and practices-planned crop rotation- green manures and cover crops- multiple cropping. Importance of organic matter – types of organic manures-Green manuring and crop residue management- Organic recycling and waste management. Organic systems-models for wetlands- dry lands and homesteads. Organic farming accreditation and certification agencies .Precision farming and other innovative methods. Farm management- principles and practices-crop calendar- farm plan preparation. Farm records and maintenance. Labour management.. Expeirmental designs-principles -analysis of variance. Completely Randomized Design - Randomized Block Design. Factorial RBD and Split Plot.

Practical

Identification of types of erosion. Different Soil conservation measures- agronomic practices. Preparation of organic farming system models for wetlands. Preparation of organic farming system models for homesteads. Visit to organic farm. Soil moisture conservation techniques in coconut and areca nut. Visit to precision farming models. Farm records and registers-daily registers - attendance register -muster rolls- forecast register .Stock registers-farm produce register and other registers. Sales and purchase – receipts and cash book. Field lay out of experiments – RBD – Split Plot. Exposure to modern agriculture – a power point presentation. Farm inventory-preparation of farm layout. Cost of cultivation and BC ratio of rice -coconut - banana- vegetables.

3. DAgri.03. Agronomy of field crops –I (2+1)

Distribution of cereals and millets- differences between cereals and millets. Botany and growth phases- climate and soil requirement- land preparation- seeds and sowing – varieties – fertilizer management- irrigation- weed control- value addition and marketing of rice-wheat-maize-sorghum-barley and oats -other millets-cassava-sweet potato - potato-yams-aroids-coleus-other minor tuber crops-pulses- cowpea-green gram - horse gram- - black gram-red gram- chick pea- soybean and other pulses-oil seeds - ground nut-sesamum-sunflower-other oilseed crops and National and International Organizations

Practical

Identification and familiarization of cereals. Work experience on of cereals in crop museum. Rice nursery – raising wet and dry nurseries. Raising mat nursery. Work experience on rice cultivation - line sowing - transplanting - weeding – fertilizer application – harvesting- threshing. Identification and familiarization of millets. Work experience on of

millets in crop museum. Identification and familiarization of tuber crops. Work experience on tuber crops in crop museum. Identification and familiarization of pulses and oilseed crops. Bio fertilizer inoculation and work experience on pulses in crop museum. Taking growth and yield observations. Herbarium and seed collection of field crops .

4. DAgri.04. Agronomy of field crops –II and Agro forestry (1+1)

Botany and growth phases- climate and soil requirement-land preparation- seeds and sowing – varieties – fertilizer management- irrigation- weed control- value addition and marketing of - Sugar crops-sugarcane-sugar beet-fibre crops-cotton- jute and other minor fibre crops-fodder and forage crops. Methods of silage preservation. Narcotics- tobacco-betel vine-green manure crops. Agro forestry systems- tree species- nursery management in agro forestry. Bio diesel plants and other economic plants

Practical

Familiarization of fibre crops and raising cotton in crop museum.Familiarization of sugar crops and raising sugarcane in crop museum. Familiarization of green manure crops and raising green manures in crop museum.Familiarization of narcotic crops and raising betel vine in crop museum.Familiarization of Forage crops and raising fodder crop in crop museum.Visit to College of Forestry/ KFRI/ KLDB/Thiruvazhamkunnu-Preparation of silage .Work experience on tapioca cultivation .Herbarium and seed collection of forage crops and green manure crops. Identification of agro forestry plants. Nursery management in agro forestry. Taking growth and yield observations

II. SOIL SCIENCE AND AGRICULTURAL CHEMISTRY

1. DAgri.05. Fundamentals of Soil Science (1+1)

Definition of soil – earth-origin-earth crust-composition .Rocks and minerals– different kind of- rocks- minerals-formation and classification. Weathering of rocks and minerals-type and classification. Soil formation (horizons, monolith etc) and profile development. Properties of soil -physical properties –texture, structure-classification etc. Soil chemical and biological properties .Soil colloids-colloidal properties-different kind of colloids. Layer silicate clay minerals-genesis –classification and source of charges. Soil water and soil air. Soil taxonomy and its characteristics.S oil classification-different systems of classification. Remote sensing and GIS. Land capability classification. Soils of Kerala. Soils of India. Soil acidity , liming materials and lime requirements.Soil salinity and soil alkalinity and its amelioration.

Practical

Identification of rocks and minerals. Excavation and description of a soil profile. Visit to soil survey office. Soil sampling and processing. Determination of bulk density ,particle density , water holding capacity and porosity. Determination of soil texture and textural class. Determination of soil pH, EC and soil organic matter. Determination of cataion exchange capacity of soil. Determination of soil micro flora. Determination of lime requirement of soil. Collection and submission of various rocks. Collection and submission of various minerals. Collection of various soils of Kerala.

2.DAgri.06. Soil fertility and fertilizers (1+1)

Soil as a source of plant nutrients. Arnon's criteria of essentiality and essential and beneficial elements. Forms of nutrients in soil-mechanisms of nutrient transport to plants-factors affecting nutrient availability to plants. Metabolic function s of nutrients. Deficiency and toxicity of nutrients and their correction. Soil fertility evaluation-different approaches for soil fertility evaluation. Soil testing- Chemical methods-critical levels of nutrients in soil. Plant analysis-critical levels of nutrients in plants. Biological methods of fertility analysis. Chemical fertilizers-straight, complex and mixed fertilizers-trace element fertilizers. Organic manures-bulky and concentrated. Bio-fertilizers-group of bio-fertilizers. Integrated nutrient management-Integrated plant nutrient management system. Nutrient cycles in soil- C,N,P,S. Organic farming-concepts and components. Irrigation water-quality of irrigation water- Indian standards of water quality.

Practical

Introduction to analytical instruments &preparation of standard solutions. Collection and preparation of soil sample for analysis. Determination of available N, P and K in soil . Collection and preparation of plant sample for analysis. Dry ashing of plant material and wet digestion of plant material. Determination of N, P and K in plant sample . Identification of organic manures, fertilizers and bio-fertilizers and other nutrient sources .Making compost, enriched FYM and vermicompost and working out their cost of preparation. Preparation of various fermented manures –panchagavya and jeevamruth .Applications of bio-fertilizer and preparation of bio composts. Testing methods of water

III. PLANT BREEDING

1. DAgri.07. Principles and practices of Plant Breeding & Plant Physiology (2+1)

Introduction- history- objectives and activities of plant breeding. Basic principles of genetics .Basis of heredity- chromosome- DNA- gene. Taxonomy of important crops. Qualitative and quantitative characters – genotype- phenotype- inheritance. Biometrical techniques. Ideotype concept. Centres of origin of important crops. Biodiversity and germplasm conservation. Organizations involved in crop improvement – National and International organizations. IPR and related laws. Transport ad translocation of water and solutes. Physiological disorders of rice- vegetables and fruits. Photosynthesis- general principles- physiological and ecological considerations. Respiration- assimilation of mineral nutrients. Plant defense: surface protection and secondary metabolites. Growth regulators – auxin and gibberellins - mode of action and practical applications. Cytokinin and ethylene - mode of action and practical applications. Abscisic acid and other growth regulators - mode of action and practical applications. The control of flowering. Seed physiology. Herbicide physiology. Water deficit and salinity - physiology - management aspects. Submergence - chilling and freezing- physiology - management aspects .High temperature physiology - management aspects. Air pollution physiology - management aspects.

Practical

Taxonomy- morphology- floral biology and floral diagram of important crops – rice- cowpea- coconut- groundnut- sesamum- bhindi- chilli- tomato- maize- sunflower- tapioca etc. Nutrient deficiency disorders Transpiration- types of stomata. Growth parameters. Plant growth hormones. Estimation of proline.

2. DAgri.08. Breeding of crops (1+1)

Mode of reproduction and pollination in crop plants. Self incompatibility and male sterility. Plant introduction agencies in India and purpose of introduction- varieties developed- merits and demerits. Breeding techniques for self pollinated crops – selection- pureline theory- varieties developed- merits and demerits. Hybridization – techniques- consequences- wide hybridization- varieties developed. Mass selection and pureline selection- varieties developed- merits and demerits. Pedigree selection- bulk method - varieties developed- merits and demerits. Back cross method- single seed decent – varieties developed- merits and demerits. Breeding techniques for cross pollinated crops- heterosis and inbreeding depression. Population improvement. Hybrids and synthetics - varieties developed- merits and demerits. Breeding techniques for clonally propagated crops- varieties developed- merits and demerits. Breeding for resistance and quality. Mutation breeding in crop improvement- varieties developed .Polyploidy breeding in crop improvement- varieties developed. Modern techniques in plant breeding – biotechnology. Bioinformatics .

Practical

Anthesis- pollination- selfing- emasculation- crossing and collection of F_1 seeds : rice-cowpea-groundnut-sesamum- maize-sunflower-bhindi-cucurbits-vanilla - anthurium-

IV. HORTICULTURE

1. **DAgri.09. Introductory Horticulture (1+1)**

Definition and importance of horticulture- importance of horticultural crops to the state and country. Classification of horticultural crops. Phases of growth and development of horticultural crops. Flowering and fruiting habits- Factors associated with flowering and fruit set. Fruit development – fruit drop factors and control measures. Plant growth regulators – role in horticultural crops – preparation and method of application Commercial orchards, Plantations and other perennial crops – climate, site selection, land preparation. Orchard lay out and planting systems. Tree forms – training and pruning. Plant propagation –types of propagation – advantages and disadvantages of different methods- potting media preparation. Seed propagation- seed bed preparation- seed dormancy- pre-sowing treatments-sowing and aftercare. Asexual propagation- apomictic embryos –plant modifications for vegetative propagation. Cuttings and layering – different methods-advantages and disadvantages. Budding and grafting – different methods-advantages and disadvantages. Components of Nursery - nursery plants - production unit -sales unit - display area -nursery management. Plant

propagating structures –green house – mist chambers. Micro-propagation – steps involved - methods- advantages and disadvantages

Practical

Identification of horticultural crops. Visit to commercial orchard. Preparing orchard lay out Training and pruning of horticultural crops. Familiarization of components of nursery-nursery structure -hardening units. Preparation of potting mixture and potting in different containers/polybags. Plant propagation- seeds-pre sowing treatments –sowing-irrigationPlant propagation- cutting- layering- budding-grafting .Visit to horticultural nursery. Visit to tissue cultural lab.

2. DAgri.10. Fruits and vegetables (2+1)

Important vegetable crops- production- productivity and distribution- nutritive value of vegetables- economic importance and scope of vegetable crops in Kerala. Classification of vegetables-types of classification–botanical-cultural classification-classification based on parts used – classification based on duration. Care and management-irrigation requirements of vegetables - surface irrigation- sprinkler irrigation- drip irrigation- fertigation etc. Types of vegetable gardens- nutrition garden- vegetable forcing- hydroponics- aeroponics-river bed system- terrace garden etc. Vegetable gardens for seed production. Vegetable nursery-seed and seedlings production- transplanting- care and management of vegetable nursery. Plant protection- special precautions in vegetables-methods of control- organic management etc. Export of vegetables Varieties- cultivation- problems and prospects of solanaceous vegetables. Varieties- cultivation- problems and prospects of cucurbitaceous vegetables-leguminous vegetables-leafy vegetables and bhindi - perennial vegetables- cool season vegetables-under exploited vegetables. Organic cultivation of vegetables. Hybrid seed production in vegetables. Protected cultivation of vegetables

Fruit crops

Importance- production and productivity-commercial importance- classification of fruits based on climatic requirements-nutritive value of fruits-South Indian fruits. Mango-botany-varieties-climatic and soil requirements-problem and prospects of mango cultivation. Propagation methods/major pre planting and post planting operations-manurial requirements of mango-plant protection flowering-factors affecting flowering- fruit set and fruit drop-use of growth regulators-harvest indices- ripening- harvesting- grading-packing- storing and transporting-post harvest utilization. Banana- genomic classification-scoring-important varieties- climate and soil requirements-propagation-selection of suckers-planting in commercial plantations- manuring- irrigation and other post planting operations-flowering and factors affecting flowering and fruiting-harvest indices-harvesting- grading-packing-ratooning - plant protection. Pineapple- varieties- general plant description-flowering and fruit characters- climate and soil-propagation-systems of planting-population density-manuring and inter cultural operations- flowering - manipulation of flowering through bio-regulator application-harvest indices-yield- ratooning-staggering production-physiological disorders-major pests and diseases-Varieties-climatic requirements- cultivation practices etc of papaya-jack and sapota. Grapes- climatic and soil requirements-peculiarities of south Indian viticulture- varieties-commercial classification-propagation- planting- training-objectives-

important systems- pruning methods and seasons types and season-flowering and fruit set-GR applications-harvest and handling of fruits. Citrus- propagation- species and varieties-commercial cultivation practices.Under exploited and unexploited minor tropical and sub tropical fruits-anonas- aonla- jamun- west indian cherry- garcinia- tamarind- passion fruit-litchi- rambutan- mangosteen- avocado- durian etc-general aspects of cultivation. etc Major temperate fruits-apple- pear- peach- plum- apricot etc -varieties- propagation and planting-high density planting-orchard management –plantation and orchard management. Cultivation of fruits and vegetables in deserts. Organic management of fruit crops

Practical

Familiarization of different vegetable crops and their varieties through field visits and slide show.Preparation of nursery bed- sowing and after care of vegetable nursery. Main field preparation and planting of various vegetable crops. Layout of nutrition garden and preparation of crop calendar. Calculation of fertilizer requirement- application by different methods- after care and management of crops. Maturity indices and harvesting of vegetables for vegetable purpose and seed purpose. seed extraction- seed processing and storage methods. Identification and familiarization of cool season vegetables. Visit to the farmer's fields in the vegetable growing areas . Production of hybrid seeds of solanaceous crops. Rain shelter cultivation of vegetables-seedling production and planting in rain shelter. Irrigation-fertigation and management of vegetables in rain shelter. Propagation of fruit crops-cutting-layering- budding- grafting. Identification of varieties of mango- banana and pineapple-scoring technique in banana. Maturity indices of major fruit crops-mango- banana- Jack-pineapple etc. Hormone application in pineapple. Field management in banana including planting- manuring- propping- identification of pest and diseases and their control

DAgri.11 Plantation crops, spices, medicinal and aromatic plants (2+1)

Coconut: botany-varieties-selection of mother palm- seed nut collection-production and selection of seedling- climate and soil-site selection-layout and planting- care and management of young and adult palms-manuring- irrigation- moisture conservation-intercropping-coconut based cropping system-major pest and diseases and their management-harvesting- tapping- products and by products-coconut based industries. Areca nut: importance-botany and varieties- climate and soil-mother palm selection-nursery technique-selection of seedlings- site selection-land preparation-lay out and planting- management of palms- major pest and diseases and their management-areca nut based cropping systems-harvesting -processing-marketing. Oil palm: botany and varieties- seed germination and other nursery techniques- climate and soil-site selection-lay out –planting- management of palms-harvesting -processing. Rubber: botany and varieties-clones-nursery techniques- climate and soil-site selection-layout and planting-management of plantation- management of trees before and after commencement of tapping-cover cropping-intercropping-systems of tapping- latex stimulation-major pest and diseases and their management-processing of latex –products. Cashew: botany and varieties- nursery technique- climate and soil-site selection-layout and planting-cultural practices-intercropping-harvesting- major pest and diseases and their management-processing of nut and apple. Tea: botany-clones- climate and soil- nursery techniques- site selection-land preparation-lay out and planting- shade regulation-climate and soil-cultural practices-systems of training and pruning- harvesting and processing. Coffee: botany and varieties- nursery technique- climate and soil- layout and planting-management-training and pruning-manuring-irrigation- flowering- harvesting- processing. Cocoa: botany and varieties- climate and soil- nursery techniques- lay out-land preparation- planting-manuring and other management-training and pruning- harvesting and processing.

Spices- medicinal and aromatic plants

Introduction: spices- condiments- culinary herbs- medicinal and aromatic plants-definition-classification and uses. Pepper: botany and varieties-climate and soil-propagation and nursery techniques-site selection- layout and planting of standards and pepper- crop management including manuring-irrigation-shade regulation-harvesting-processing-pest and diseases management. Cultivation practices of betel vine. Ginger-turmeric- varieties- climate and soil-site selection-land preparation-planting-cultural and manurial practices-harvesting-pest and diseases management - rhizome curing--storage-products. Cardamom: varieties- climate and soil- propagation –nursery techniques planting-Manuring-weeding-trashing-mulching-irrigation-shade regulation-harvesting- processing-pest and disease management. Nutmeg: propagation- climate and soil-planting and after care-cultural practices- crop management-flowering –harvesting-processing. Cinnamon- clove-all spice and minor spices:-propagation-climate and soil-planting and after care-harvesting –processing. Vanilla - propagation- climate and soil-planting and after care -flower induction-hand pollination- harvesting and processing. Importance and scope of medicinal plants-active principles. Varieties- cultivation- post harvest handling- active principles and uses of major medicinal plants. Aromatic plant cultivation- varieties- planting- management and harvesting of major aromatic crops- lemon grass- palmarosa-- citronella- vetiver.Other minor medicinal and essential oil yielding plants.

Practical

Coconut: floral biology-varietal characters- techniques of selfing and crossing - mother palm selection-nursery preparation and planting - seedling selection husk burial-fertilizer application- hybrid seed production-pest and disease management. Areca nut: floral biology- Identification of varieties- nursery preparation-seedling selection-planting. Oil palm: floral biology- identification of varieties. Rubber: floral biology- nursery technique and planting. Visit to rubber estate and rubber factory. Cashew: propagation techniques-processing of fruits and nuts. Pepper-identification of varieties - propagation-rapid multiplication - harvesting and processing. Ginger-turmeric- Identification of varieties-planting of ginger and turmeric-processing. Cardamom- nutmeg and clove- cinnamon and allspice-varieties-identification of commercial parts. Vanilla- floral biology-hand pollination-vanilla curing. Visit to herbal gardens for identification of important medicinal and aromatic plants. Herbarium specimens of important medicinal and aromatic plants. Identification of major medicinal and aromatic plants and their commercial varieties. Propagation techniques and raising of major medicinal and aromatic plants. Visit to cocoa gardens and cocoa processing units.

V. AGRICULTURAL ENGINEERING

1. DAgri.12. Farm power and energy (1+1)

Concept of work- power and energy- different forms-energy efficiency. Energy use in agriculture-equivalent energy coefficients-calculation of energy input. Energy and environment- global warming- need for energy conservation. Classification of energy sources-concept of renewable energy. Power sources in the farm- requirements for various applications. Electricity-basic electrical engineering concepts. Electric motors-basic principles-different types. Mechanical power- IC engines. Working principle of CI engine-parts. Working principle of SI engine-parts. Engine systems. Tractors and their systems. Power tillers and their application for different agricultural operations.Energy from

biomass- improved biomass stoves. Principles of anaerobic digestion technology- biogas plants- basic design principles. Factors affecting performance of biogas systems- popular biogas plant models. Solar energy fundamentals- solar thermal devices- Basic principles of PV systems- applications and gadgets.

Practical

Electric motor. CI engine- parts and working. SI engine- parts and working. Tractor and parts. Power tillers. Measurement of fuel consumption and energy use in agricultural machines. Study of PV gadgets .Study of solar drier. Estimation of thermal efficiency of biomass stove. Study of floating drum type and fixed dome type biogas plants. Fabrication of a portable biogas plant. Visit to renewable energy installations.

2. DAgri.13. Farm implements and machinery (1+2)

Agricultural implements- historic development- simple machines. Different types of hand tools and manual soil working implements. Tillage- primary tillage implements- MB plough-disc plough- subsoiler- chisel plough. Secondary tillage implements – cultivators- harrows- bund former and furrower- definitions- field capacity-draft- field efficiency .Rotavator- puddlers -earth drills and terracer blade. Sowing methods-implements and machines for seed and fertilizer drilling- seeding and planting of seeds. Transplanting implements and machines- principle of operation of rice transplanter-mat nursery preparation. Different types of rice transplanting machines. Weeding implements for garden land and rice-rotary weeders-brush cutter-slasher.Principle of operation of hydraulic and pneumatic sprayers. Power sprayers and blowers. Reaping, threshing and winnowing machines. Combine harvesters .Straw harvesting-balers-chaff cutters and other latest machines on paddy cultivation. Unit operations in post harvest processing of rice- cleaning, grading- parboiling- drying and storage. Milling of paddy-products and by product utilization of paddy.Calculation of cost of operation of machines-Breakeven analysis.

Practical

Study of work shop tools. Study of hand tools and manual soil working implements. Operation of tractor drawn MB plough. Operation of tractor drawn disc plough. Operation of tractor operated cultivator. Operation of tractor operated disc harrow. Operation of puddler. Operation of rotovator. Operation of power tiller. Operation of bund former .Operation of post hole digger.Operation of earth drills. Calibration and operation of tractor operated seeding machine for dry sowing of rice. Operation of drum seeder for wet seeding of rice. Preparation of mat nursery for rice. Operation of different types rice transplanters. Operation of cono weeder and finger type rotary weeder. Operation of brush cutter .Operation of tractor operated slasher. Operation of vertical conveyor reaper. Operation of hold on type paddy thresher. Operation of flow through type paddy thresher. Study of combine harvester. Visit to farm implements manufacturing centre. Visit to farm machinery manufacturing centre. Study on various types of cleaners, graders and driers. Study on different milling methods- hullers, rubber roll sheller and polisher. Visits to various institutions of KAU- various Agro Industries of State Government- Small Scale Industries Units.

3. DAgri.14. Soil and water conservation and irrigation engineering (1+1)

Types of soil erosion- estimating soil erosion- universal soil loss equation. Contouring. Graded bunds- bench terraces- contour bunds- check dams- earth dams- drop spillway- chute spillway- drop inlet spillway. Hydrological soil groups- rational method of predicting runoff rates- runoff hydrograph .Controlling runoff and vegetation in gully control- changing gullies to grassed waterways -establishment of sod flumes- sod checks and shrub checks. Checking the growth of gullies- temporary and permanent gully control structures. Irrigation terminology- surface irrigation methods-free flooding- border- check basin and furrow. Sprinkler and drip irrigation systems- fertigation- micro irrigation-command area concepts and components. Terms and definitions related to pumping- types of pumps- classification- common irrigation pumps and components.Centrifugal- turbine-submersible- jet and compressor. Characteristic curves and selection criteria of pumps-installation- priming. Problems and remedies- manufacturers- repair and maintenance of pump sets-different types of pipes- valves- foot-valves- electrical circuits and control panel for irrigation pumps. Calculation of pumping heads-efficiency-solar pumps-components and working principles. Green house technology- concepts- design criteria- construction materials and methods of construction. Green house – solar heat transfer- heating and cooling- water systems- environmental control systems and application of green houses.

Practical

Acquaintance with survey equipments .Chain surveying . Levelling. Contour surveying. Design of open channels. Design of underground pipe line systems-design of surface irrigation methods. Layout of sprinkler irrigation systems and drip irrigation systems. Engineering measures of soil conservation methods. Pumps-type-installation-problems and remedies. Repair of pumps and valves- electrical circuits and control panels. Solar pumps. Planning and design of green houses. Storage of food grains- fruits and vegetables.

VI. AGRICULTURAL ENTOMOLOGY

1. DAgri.15. Introduction to Agricultural Entomology (1+1)

Insects- definitions- their characters. Classifications of insects based on leg-wings- mouthparts and metamorphosis .Types of insects based on its orders. Economic insects- honey bees- types and rearing. Economic insects- sericulture- and other beneficial insects. Pests: definition and categories. Pest outbreaks and threshold levels. Pests monitoring- surveillance and forecasting .IPM and techniques .Bio-pesticides-bacteria- fungus- viruses- EPN and mode of action .Pesticides- its classifications and mode of action. Principle methods of pesticide applications. Insect attractants and repellants. Insect pheromones- types with examination and its role in IPM. Insect growth regulators. Pesticides act and modern trends in IPM .Modern techniques in pest control.

Practical

Insects types and identification. Identification of predators and different types of parasitoids. Identification of entomopathogens and EPN. Familiarization with different types of insecticides. Calculation of doses of insecticides and water volume. Familiarization with cultural control. Familiarization with physical control and mechanical control. Familiarization with different groups of insecticides. Preparation of spray fluid for field application .Organic approaches for pest control. Silk worm

rearing. Rearing of stinged and stingless bees. Different models of bee hives and honey extraction with extractor. Mass culturing of pupal parasitoids. Types of insect traps.

2. DAgri.16. Crop pest management –I (1+1)

Insect Damage symptoms- - Life stages and management of insect and non insect pests of Cereals (rice- wheat- sorghum-maize and minor millets). Plantation crops (coconut-areca nut- oil Palm- cashew). Fruits (mango- sapota- guava- jack- banana- grapes - dates -pineapple- citrus)

Practical

Identification of pests. Identification of the damage symptom. IPM package of practices for important crops. Collection of crop pests and submission

3. DAgri.17. Crop pest management –II (1+1)

Damage symptoms - life stages and management of insect and non insect pests of vegetables (Brinjal- bhindi- tomato- cucurbits- crucifers- chillies- pulses- root vegetables). sugarcane- cotton- ground nut and oil seeds- spices (pepper- ginger-cardamom) Flower crops- Medicinal and Aromatic plants- Tuber crops. Pests of stored materials and their management. Nematode pests of cereals- fruits- vegetables- Rodent and bird pests and their management.

Practical

Identification of pests. Identification of the damage symptom. Life stages of important pests in different crops and stored products. Collection and preservation of stored products of important crops. IPM package of practices for important crops. Pests of stored materials and their management. Rodents- bird pests and their management. Collection of crop pests and submission.

VII. PLANT PATHOLOGY

1. DAgri.18. Introductory Plant Pathology (1+1)

Introduction to plant pathology- definition- terms. General characters and classification of fungi- methods of reproduction. Key to divisions and subdivisions-with examples of fungi of plant pathological and other significance. General characters of bacteria- structure- reproduction and symptoms of bacterial diseases. General characters of virus- classification and symptoms of virus diseases- virus vector relationship. Phanerogamic parasites. Epidemiology. Crop loss assessment and disease forecasting.

Practical

Plant Pathology laboratory and equipments. Microscopes- identification of plant diseases. Symptoms of fungal- bacterial and viral diseases. Preservation of

disease specimens. Slide preparation for microscopic examination. Familiarization of stains and mountants. Preparation of culture media. Isolation of fungi- microscopic observation of fungi belonging to different groups. Staining of bacteria. Familiarization of phanerogamic parasites. Crop loss assessment- proving Koch's postulate. Familiarization and use of fungicides and biocontrol agents

2. DAgri.19. Diseases of field crops and their management (2+1)

Symptoms- etiology and control measures of the following crop diseases - Diseases of rice and wheat- millets- maize- sorgum- bajra- Diseases of vegetables - solanaceous crops- cucurbits- bhindi- cool season vegetables- leafy vegetables- diseases of cowpea and pulses- diseases of sesamum- sunflower- sugarcane- tobacco and diseases of tuber crops.

Practical

Study of symptoms and pathogens of crop diseases- cereals and millets- vegetables- solanaceous crops- cucurbits- bhindi- cool season vegetables- leafy vegetables- cowpea and pulses- sesamum- sunflower- tobacco- sugarcane and tuber crops.

3. DAgri.20. Diseases of Horticultural crops and their management (1+1)

Economic importance- symptoms- etiology and management of diseases of coconut- oil palm-areca nut- cocoa- rubber- cashew- tea- coffee- cardamom- diseases of spices- pepper- ginger- turmeric- vanilla- tree spices. Diseases of fruits-banana- pineapple- mango- jack- sapota- grapes-citrus fruits- dates-guava- papaya. Diseases of ornamental plants.

Practical

Study of symptoms of diseases of coconut- oil palm- areca nut- cocoa- rubber- cashew- tea- coffee- cardamom- diseases of spices- pepper- ginger- turmeric- vanilla- tree spices. Diseases of fruits-banana- pineapple- mango- jack- sapota- grapes- citrus fruits- dates- guava- papaya. Diseases of ornamental plants.

VIII. AGRICULTURAL EXTENSION

1. DAgri.21. Principles and practices of Agricultural Extension (1+1)

Education- meaning- definition- types-formal- informal and non formal education. Extension education and Agricultural Extension- meaning definition- concepts- objectives- process and principles. Teaching –learning process- learning situation and steps in teaching. Rural development- objectives- importance- problems in rural development .Pre independence extension efforts in India. Community development and national extension service. Recent approaches in rural development programme. Self help groups and models. Present research- client and education system. Present extension system in India. Method of data collection. Training in extension. Leadership-types of leaders- classification and importance in agricultural extension. Motivation –types and application in extension work. Project preparation .Functions of Kerala Agricultural University

Practical

Institutions available under KAU and mandate of each station .Visit to village for data collection.Data collection-coding - analysis and interpretation. Collection of data

regarding organizational structure and function of State Department of Agriculture. Collecting activities pertaining to KVK .Undertake PRA exercise. Visit to NGO . Collecting activities pertaining to NGOs in India and Kerala .Visit to voluntary organizations like VFPCK- AHADS. Collection of funding agencies for research projects in Agriculture. Familiarization with Information cum sales counter activities. Visit to an entrepreneur .Preparing data base of farmers and institutions support for preparation of strategic research extension plan. Assignment on private extension services in India. Assignment on seed companies- fertilizer companies- Agri business companies and producer cooperatives. Preparation of project .Presentation of project

2. DAgri.22. Communication and Extension methods (2+1)

Communication-meaning- definition and importance. Communication process and key elements. Levels of communication-Interpersonal, intra personal, group and mass communication. Public speaking-types, purpose, and methods of presentation. Scientific writing and data presentation .Adoption- stages and adopter categories. Diffusion process and stages. Constraints in communication and concepts related to communication. Extension Teaching-methods and factors affecting. Classification of extension teaching method. Individual contact method. Group contact method. Mass contact method. Audio visual aids and classification. Factors in consideration for Preparation and selection of audio visual aids. Farm journalism-news story and leads. Writing feature stories. Photo journalism. Effective writing technique. Cyber extension methods. Models of cyber extension in India. Radio talk, TV talk. Indigenous Technical Knowledge(ITK).Traditional media in communicating rural people. Monitoring and evaluation in extension. Programme planning. Peoples participation. Management in extension organization. Expert system in agriculture-e-learning. Publications related to extension work. National and International Institutions and their functions. New initiatives of ICAR in technology dissemination. Distance education. Entrepreneurship development.

Practical

Conducting method demonstration. Preparation of leaflet/folder. Preparing news story. Preparing script for radio. Preparing script for television. Visit to Television channel office. Handling of multi media tools. Visit to newspaper office. Preparation of poster. Visit to Agri portal centre. Preparation of different types of charts. Preparation of visual materials like flannel graph- model- specimens and mock up. Information sources for farmer. Conducting exhibition. Conduct of training programme. Visit to video production unit .Visit to video/audio conferencing lab.

IX. AGRICULTURAL ECONOMICS

1. DAgri.23. Agricultural Economics and Marketing (2+1)

Rural economics and agricultural economics. Indian economy- mixed economy- specialty-meaning- importance and scope. Sectors of the economy- importance of agriculture in rural economy- problems of rural economy. Population- meaning- population growth and its consequences- census in India. Agents of production- land- labour- capital and organization- land- classification and usage. Land reforms- ceiling on land holding- tenurial reforms- consolidation of land holdings- co-operative farming and Bhoodan movement- success and failure. Rural labour- meaning-classification –characteristics of rural labour -

agricultural labour- employment- norms of labour on farm- gender analysis of labour. Wages and income- minimum wages act and other welfare measures. Capital- need for capital- importance of capital in agriculture. Organization – government enterprises- private- public sectors- role in agriculture- public private partnerships. Cost concepts-Rural banking-Agricultural credit and finance. Agricultural planning in India-an introduction-Five year plans- history- meaning- Mahalonobis model- importance and present day implications. Sources of finance- institutional and non-institutional- government- co-operatives. Nationalized commercial banks- regional rural banks-private money lenders and other traditional sources. Establishment of NABARD and its role- multi-agency- service area approach.

Macroeconomics- meaning- inflation. Rural industries- importance and their classification- investment needs- generation of employment. Types of agro- industries- rural industries project-Khadi and village industries- problems of rural industries. Agricultural marketing- meaning- scope- needs and problems. Concepts and definition of marketing of marketing- classification of markets- structure of markets. Specific characteristics of agricultural commodities- small quantities- bulkiness- perishability. Grading and standardization- meaning and problems. Agmark grading and commercial grading. Marketing costs and marketing margins-price spread and problems. Contract farming- an introduction. Co-operation in India- meaning of co-operation- co-operative societies. Regulated markets-concept- working and significance. Role of state co-operative movements and national agricultural co-operative movements and NAFED. Role of specialized agencies- FCI- CWC-SWC in marketing of agricultural commodities. Price support programmes-buffer stock operations. Role of commission on agricultural costs and prices- price stabilization. Market information and intelligence-concept and meaning- importance. Marketing of agricultural inputs viz- seeds- fertilizers- plant protection chemicals and implements. Globalization-meaning- importance- history- pre and post reform periods- implications in present day world.

Practical

Visit to a nearby village to study the village profile- land- water-livestock- forestry and forestry resources. Working out the cost of cultivation of crops-rice. Cost of cultivation of perennial crops-coconut. Collection of statistical data in agriculture. Collection of the data on prices of food grains .Visit to a co-operative credit society. Visit to a co-operative marketing society. Calculation of cost of living index and wages. Data collection and analysis of vegetable prices. Visit to a wholesale market. Data collection and analysis of food inflation. Visit to Agmark grading center. Visit to a regulated market. Study of the activities of NABARD. Study of implementation of important development programmes like MGNREGS etc.

X. HOME SCIENCE

1. DAgri.24. Food science, nutrition and post harvest technology (1+1)

Definition of nutrition- nutrients and nutritional status. Food-functions-classification-food groups-food pyramid-daily food guide-factors to be considered-different age groups-composition and nutritive value of common foods. Major nutrients –carbohydrate-importance-nature classification functions-digestion and absorption of carbohydrate present in foods- sources-deficiency-toxicity. Proteins-Importance- nature-classification-functions-digestion and absorption of proteins present in foods- sources-deficiency-toxicity. Fats-Importance- nature-classification-functions-digestion and absorption of fats present in foods-

sources-deficiency. Recommendation of dietary allowances of nutrients for different age groups and sex. Formulation of balanced diet for different age groups and sex. Vitamins-fat soluble-functions-digestion and absorption-sources-deficiency. Vitamins-water soluble-functions-digestion and absorption-sources-deficiency- micro nutrients –functions-deficiency-sources.

Nutritional problems of India-causes-PEM-obesity-clinical symptoms-diagnosis-management. Assessment of nutritional status-anthropometry biochemical-clinical diet surveys-determination of nutritional status of an individual. Toxicants naturally occurring in foods- food adulteration-definition-common food adulterants-prevention. Post harvest losses-conservation of nutrients- need-methods. food fortification-enrichment and restoration-objectives-levels of fortification. Food hygiene-food borne intoxification-bacterial food poisoning. food security-need- factors influencing –methods. Nutritional intervention programmes for vulnerable group-Mid day meal programme-ICDS-prophylatic programmes- anemia-Vitamin A. Post harvest management for quality produce- reasons for spoilage of fruits and vegetables -general principles and methods of preservation. Preservation by dehydration- thermal processing- chemicals preservation- germination-radiation—etc. Regulations and Specifications for fresh and processed products- packaging of fresh and processed products.

Practical

Nutritive value of important foods- cereals- millets- pulses- oil seeds- milk- meat- egg-poultry—etc. Nutritive value of important dietary food preparations. Planning balanced diet for different categories-adolescent boys and girls- pregnant woman - lactating mother. Assessment of nutritional status of male and female agricultural labourers. Detection of adulterants in edible agricultural commodities. Assessment of Body Mass Index (BMI) of different categories. General guidelines for establishment of home scale processing units-washing- sorting- grading in fruits and vegetables to increase the shelf life. Preparation of jam- jelly- pickles- sauce- preserve- dehydrated products- beverages etc. FPO and Specifications Visit to food processing units

XI. ANIMAL HUSBANDRY

1. DAgri.25. Fundamentals of Livestock, Poultry production and Fisheries (1 +1)

Introduction-role of livestock in Indian agriculture- livestock census- livestock development agencies and programmes in Kerala. Common animal husbandry terms-definition of breed-classification of indigenous and exotic cattle- breed characteristics of Sindh- Kangayam- Gir- Kankrej- Jersey- Horstein Fresian- Brown Swiss- Murrah and Surti. Systems of mating- importance of cross breeding- female reproductive system- oestrous cycle-signs of heat-time of AI-Artificial Insemination-merits and demerits- methods of AI. Care and management of pregnant cow- gestation period in different species- parturion- care and management of new borne calf- milk- definition-composition of milk- factors affecting milk yield and composition. Clean milk production- preservation of milk- pasteurization-various methods- low temperature long time- high temperature short time and ultra high temperature-advantages and disadvantages. Nutrition-definition-ration- balanced ration-requirement and importance of green fodder- conservation of fodder- hay making- silage making. Importance of health care and signs of health in cattle- diseases – classification-basic principles in controlling infections and contagious diseases. Common diseases of cattle- bacterial diseases-anthrax- haemorrhagic septicemia- black quarter- tuberculosis-brucellosis- mastitis-prevention and control- viral diseases-foot and mouth disease-rabies-

prevention and control- non specific diseases of cattle-milk fever- ketosis- lactic acidosis- typanites.

Goat farming- breeds-indigenous and exotic origin-nomenclature- housing- breeding – feeding.Care and management of buck-doe and kids- rabbit rearing-breeds- nomenclature –housing- feeding- breeding- care and management .Dogs -common breeds- nomenclature- housing- care and management- control and prevention of diseases. Swine husbandry-common breeds- nomenclature- housing- care and management of sow- boar and piglets- control and prevention of swine diseases-hog cholera and foot and mouth diseases. Horse and camel husbandry-common breeds- nomenclature- housing- care and management- control and prevention of diseases. Poultry-definition-poultry production in India-common terms in poultry science-introduction of systems of poultry - chicks/ quail/ emu rearing-deep litter- cage and backyard systems. Brooding and rearing of chicks- rearing of growers and layers- broiler rearing. Common disease-symptoms and prevention in poultry-bacterial-coryza- salmonellosis- viral-ranikhet disease-infectious bursal disease- protozoan-coccidiosis- vaccination schedule for poultry. Aquaculture-ornamental fisheries-breeds of fishes-feeding-breeding --care and management-control and prevention of important diseases .

Practical

Body parts of cow- identification of animals. Instruments used in animal husbandry practices- ageing of cattle. Housing of cattle. Milking of animals-milking machines. Physical examination of milk and determination of specific gravity. Determination of fat percentage-total solids- solids not fat in milk. Legal standards of milk-determination of adulterants in milk. Common cattle feeds and their classification. Measuring usefulness of feed. Feeding and calculation of feed for dairy cattle. Body parts and handling of birds- classification of poultry. Housing and management of poultry- -culling of unproductive birds-demonstration of vaccination and deworming. Visit to Veterinary College, Mannuthy. Visit to commercial poultry farm. Broiler poultry farming and cost benefit analysis. Aquaculture-acquaintance of different breeds of fishes-ornamental and commercial. Visit to fish breeding units

XII. COMMERCIAL AGRICULTURE

1. DAgri.26 (cag.1) **Agro-waste management (**Agron./Ssac) **(0+1)**

Different types of bio-waste. Collection segregation and treatment of bio-waste Problems of bio-waste. By-product utilization of coconut- sugar- textile- leather- food processing and ayurveda industries. Urban waste management-bio-composting of wastes. Various methods of composting-techniques for augmenting- Vermicomposting. Biogas-fuel- lighting- and electricity. Bio-agent utilization in waste management-E.M preparations Bio-waste management with mushrooms.Visit to by-product utilization/waste management unit. Practical exercise on waste utilization. Project preparation for waste utilization plant.

2. DAgri.27 (cag.2) **Seed Technology** (Agron./Pbgn) **(1+1)**

Introduction to seed – seed quality- classes of quality seed. Requirements for quality seed- purity – genetic and physical- moisture- germination. Germination and purity standards of important crops. Operations essential to seed industry- breeding new variety- seed multiplication- seed processing-storage and marketing. Quality seed production-isolation- cultivation- field management. Post harvest management-precautions for

harvesting and threshing. Seed processing and storage-drying –cleaning –grading- seed treatment- seed storage. Seed testing- germination- purity- moisture tests. Seed standards for genetic purity- maintenance of genetic purity– nucleus seed production Seed certification-certification standards- field inspection- roguingClasses of seeds-nucleus seed- breeder seed- foundation seedSeed production techniques for important cereal crops- rice- maize-pulse- oil seeds and others. Hybrid rice seed production techniques. Seed production programmes of state and central government

Practical

Identification of crop seeds. Key characteristics of important varieties. Introduction to seed testing - laboratory equipments .Seed sampling and maintenance of registers. Seed testing – genetic purity analysis. Seed testing moisture and physical purity tests. Seed testing -germination and viability tests. Work experience on nucleus seed-breeder seed and foundation seed. Grow out test –field observations of genetic purity. Hybrid rice seed production techniques. Field management techniques of seed production plots- isolation-removal of off types. Post harvest handling of seed- threshing and drying-precautions. Introduction to seed processing machines- seed pre cleaning and grading and upgrading. Introduction to seed processing machines- seed upgrading- Bagging -labeling and storage. Value addition of seed and seed treatment. Visit to private seed company-VFPCK. Visit to participatory seed production units and seed villages.

3.DAgri.28 (cag.3) Commercial Floriculture (Hort)
(1+1)

Scope of Floriculture. Varieties- propagation- cultivation and post harvest handling of orchids – anthuriums- rose- jasmine-- gerbera- chryanthemeum-gladiolus- tube rose-carnation-heloiconia- alpinia- crossandra- marigold and other annual flowers. Value addition of flowers. Protected cultivation. Landscape designing and preparation of landscape plan. Classification and production of garden plants. Establishment and maintenance of lawn. Production of potted plants. Establishment and maintenance of gardens. Indoor gardening.

Practical

Identification of garden plants-propagation of garden plants.Plant propagation and management practices of orchids- anthuriums-rose-jasmine-chrysanthemeum- gerbera-heliconia- alpinia and other annuals.Plant propagation and management practices of foliage plants. Post harvest handling of cut flowers. Production of dry flowers. Visit to commercial production units of anthurium- orchids.Visit to homestead cultivation of orchids and anthurium. Visit to flower markets. Preparation of landscape designs. Establishment of model ornamental garden .Establishment and maintenance of lawns. Establishment of indoor gardens.

4. DAgri.29(cag4) Nursery techniques and plant tissue culture (Hort) **(0+2)**

Components of nursery. Nursery implements. Nursery structures. Potting mixture preparation and potting. Seed bed preparation and sowing. Propagation with cuttings. Propagation through different methods of layering. Budding. Grafting. Plant growth regulators preparation and use for plant propagation. Care and management of nursery plants. Visit to commercial nursery. Familiarization with tissue culture laboratory

.Equipments in tissue culture lab. Contamination checking. Media preparation. Stock preparation. Explant selection of banana. Initiation of banana. Subculturing and multiplication of banana. Hardening of banana. Explant selection of pineapple .Initiation of pineapple. Subculturing and multiplication of pineapple .Hardening of pineapple. Work experience on production of tissue culture banana and pineapple. Visit to commercial tissue culture production units.

5.DAgri. 30(cag.5) Post harvest management (hort./Ag.Engg.) (0+1)

Studies on engineering properties of agricultural crops-roudness- sphericity- angle of repose-coefficient of friction-terminal velocity. Studies on various types of driers and preparation of drying curves-trya-cabinet drier-fluidized bed drier. Lay out and preparation of fruit processing plants. Studies on various size reduction equipments. Post harvest management of paddy- seed treatment-storage and packing. Post harvest management of pulses and oil seeds. Cost benefit ratio of important seed crops. Seed treatment storage and packing in vegetables. Visit to commercial rice mill. Farm level processing of plantation crops- spices. Medicinal plants- parts used. Handling of cut flowers- visit to flower market.

6. DAgri.31. Micro irrigation and watershed management (Agron./Ag.Engg) (**0+1)**

Systems of micro irrigation methods-sprinkler- drip- bubbler-basic requirements .Components of sprinkler irrigation systems-mains-sub mains- laterals- filters -sprinkler heads-maxi- mini- micro. Components of drip irrigation systems- mains-submains-laterals-filters-drippers/emitters-fertigation- chemigation-pivot irrigation.Land use capability classification. Measurement of slope of an area and preparation of contour bunds. Locating major irrigation dams in Kerala. Resource appraisal-basic and secondary data collection-water resources .Familiarization of cadastral and contour maps and delineation of watersheds.Soil and water conservation structures- percolation pits- renovation of existing ponds etc. Agronomic measures- contour bunds- strip cropping- afforestration- vegetative fencing. Opening basins around coconut and areca nut. Water harvesting structures- Ferro cement tank- ground level tank- mechanical measures. Methods of ground water recharge- roof water harvesting- percolation pits etc. Monitoring ground water level. Preparation of watershed development plan of a village. Preparation of resource maps- Study of watershed characteristics-physical and geomorphological analysis of data for watershed management-prepration of plan.Field studies of ongoing schemes- Visit to AHADS-NWDPRA/CWRDM-case studies

7. DAgri.32(cag.7) Commercial production of bio-control agents (Pl.path./Ent) **(0+1)**

Role of bio-control agents in pests and disease management. Familiarization of important bio-control agents for crop pest and disease management. Isolation of bio-control agents. Pure culturing. Mass production of *Trichoderma- Pseudomonas fluorescens- Trichogramma- Verticillium- Beuveria*. Project preparation for setting up of bio control production units .Methods of application of bio-control agents

8. DAgri.33(cag.8) Mushroom cultivation (Pl. path) **(0+1)**

Importance of mushroom cultivation- equipments used in mushroom laboratory- sterilization procedure used in mushroom laboratory. Preparation of culture media. Pure culture techniques- spawn production- mushroom cultivation. Paddy straw mushroom and milky mushroom. Management of pests and diseases of mushroom. Methods of harvesting mushroom. Post harvest treatment and preservation of mushrooms. Packaging and processing. Design and layout of mushroom farm. Cost analysis of mushroom farm and preparation of projects.

9. DAgri.34(cag.9) Use & maintenance of plant protection equipments (Path/Ent) **(0+1)**

Familiarization of plant protection equipments. Repair and maintenance of plant protection equipments. Precautionary measures in handling of plant protection chemicals. Preparation of Bordeaux mixture- cheshunt compound- botanical pesticides. Calculation of pesticide formulations. Different group of pesticides based on toxicity. Methods of application of fungicides- insecticides and weedicides. Different bio-control agents and methods of application. Demonstration of working of different types of sprayers. Safety measures in handling pesticides.

XIII.TRAINING

1.DAgri.35. Training-I (0+3)

Students will be given special training on the following modules *viz.*

Krishi Bhavan –-Co Operative Bank & Industries

2. DAgri.36. Training-II (0+4)

Students will be given special training on the following modules *viz.*

SHG/NGO Farm Management –EDP-Farm Planning and Project Preparation.

XIV. COMPUTER (NON CREDIT COURSE)

1.DAgri.37. Computer application (0 +1)

Introduction to computers – definition – history – different type of computers viz., desktop, laptop, netbooks, tablet PC .Hardware and software – installation of computers – prerequisites of computers power supply and UPS. Installation of computers with peripherals viz., printers, LCD's – its operations – remote controls. Different operating systems – MS-DOS, Windows, Linux, Unix and its installation procedures. Microsoft office basics and fundamentals – Open office – Word processing. Microsoft Word different versions – version compatibility – reports models and templates – brochures and booklets designing in Word. Spread Sheet and Excel- different versions and its compatibility. Data entry - calculations and statistics in excel sheet – graphs and charts using excel sheet. Power point usage and skills in using dynamic presentations – add and merging data files, images and video's in power point

presentations. Imaging software's – Microsoft Image viewer, paints and its usage in drawing and editing images. Internet usage – search engines – Web sites searching – basics of web design and its basics/meta tags in search engines. E-mails – POP mails – e-mail accounts creation and usage of e-mails for sending different files – Zip filing .Multimedia software's – paint shop pro, coral draw, flash movies – different video files editing, conversions of video files and voice editing. Computer applications in Precision farming – Hi-tech agriculture – remote control on-off through computer. Decision support systems – instant programming in Microsoft office for agro inputs calculations .Computer backups – data restorations – efficient management of computers – virus softwares and scanning of computer– defragmentation – disc cleanups. Trouble shooting the basic problems in computers, printers and LCD's. E-commerce – online shopping – web portals for agri trading.

XIV.STUDY TOUR (Non-Credit course)

1. DAgri.38 South India Study tour (0+1)

A South India Study Tour will be conducted for 15 days duration after the second semester during the semester break.

- The students will visit various institutions in the South India
    - National and International level institutions related to Agriculture- Horticulture- Forestry and other allied fields,
    - Major agro-based industries- commercial farms
    - Research stations in various agro-climatic regions of the country.
- The students will gain first-hand knowledge about different agro climatic zones- crops grown- cultivation practice- socio-cultural and economic setting of the farming communities.
- Students will maintain a tour dairy to record their observations at the places of visit.
- A tour report has to be submitted after the tour.
- They will collect specimens- seeds etc and submit after the tour