

AGRICULTURE OFFICER

Education Qualification:

- **Agriculture Officer:** Bachelor's degree in Agriculture (B.Sc., Agriculture)
- **Assistant Agriculture Officer [AAO]:** Must have passed Higher Secondary (plus two) Examination.) Must possess two years Diploma in Agriculture from the Institutions recognized by the Government of Tamil Nadu or affiliated with the Tamil Nadu Agricultural University.
- **Assistant Horticultural Officer [AHO]:** A Pass in Higher Secondary Examination. A pass in the two years Diploma course in Horticulture in the Institutions approved by Tamil Nadu Agricultural University or Director of Horticulture and Plantation Crops or Gandhigram Rural University.
- **Assistant Director of Horticulture & Horticultural Officer:** Candidates Possess a degree in BSC & M.Sc Horticulture.

Age Limit: Minimum Age 18 Years and Maximum Age 30 Years.

SCs, SC(A)s, STs, MBCs/DCs, BCs, BCMs and Widows: No Age Limit

No maximum age limit shall mean that the applicants should not have completed 58 years of age either on the date of notification or at the time of selection/appointment to the post.

The upper age limit is 32 years for the persons holding a postgraduate or higher degree in Agriculture such as M.Sc. (Agriculture) or Ph.D. in Agriculture.

AGRICULTURAL OFFICER EXAM SYLLABUS

PAPER-I AGRICULTURE (DEGREE STANDARD)

UNIT- I: IMPORTANCE OF AGRICULTURE Importance of Agriculture in Indian Economy and its sectoral relationship - Agricultural Development through five year plans in India and Tamil Nadu - Growth pattern of crops in India and Tamil Nadu in terms of area, production and productivity - Government Agricultural Policies – Agricultural development through NITI AYOOG – Import and export – Role of NSC, FCI and PDS.

UNIT - II: FUNDAMENTALS OF CROP PRODUCTION Factors of Production - Agricultural seasons of India and Tamil Nadu - Cropping patterns in India and Tamil Nadu - Package of practices of different crops - Agro-Climatic zones of India and Tamil Nadu and their features - Weather and Climate - Weather forecasting - Climate change and its impact – Minimal tillage practices – Stress mitigating technologies including microorganisms – Nanoparticles and their applications.

UNIT - III: NATURAL RESOURCE MANAGEMENT Soil - Soil structure - Factors influencing soil structure - Physical and Chemical properties - Effect of nutrient availability and plant growth - Problem soils and their management - Soil survey - Its objectives and scope - Soil fertility and productivity - Dry farming - Rainfed agriculture - Conservation of soil and water - Watershed and waste land development. Land use pattern and planning - Size and distribution of holdings - Types and systems of farming - Water resources development and management - Command area development - Ground water Development and Conjunctive use - Water use efficiency - Quality of irrigation water - Its effect in soil and crops - Management of poor quality water for crop growth.

UNIT - IV: CROP MANAGEMENT & ALLIED AGRICULTURAL ACTIVITIES Cropping systems and integrated farming - Recycling of agricultural waste - Organic manures, green manures, bio fertilizers - Balanced usage - Integrated nutrient management - Physiological disorders in crop plants and their management- Irrigation management of different crops Mushroom cultivation, bee keeping, silkworm rearing etc., Energy in Agricultural production - Sources - Solar, wind, animal, biomass and biogas - Mechanization in agriculture - Tractors & tillers - Agricultural implements and Machineries and their usage - livestock and poultry rearing.

UNIT - V: CROP IMPROVEMENT Principles of breeding - Breeding methods in self , cross and vegetatively propagated crops - Modern tools in crop improvement – Heterosis breeding and Hybrid seed production technologies - Latest varieties of major crops in Tamil Nadu - Breeding for climate resilience varieties – Variety release procedures - Application of bio technology in agriculture - Tissue culture & its significance - Transgenic Plants. Plant Genetic Resources:Collection conservation and exchange-Crop varietal protection-PPV& FR authority and its role.

UNIT- VI: SEED SCIENCE AND TECHNOLOGY Seeds - Importance of quality seeds in agriculture – Nucleus, breeder, foundation, certified and labelled seeds - Seed certification techniques and processing in Tamil Nadu - Seed testing – Seed testing laboratories-ISTA

standards for seed testing - Seed village concept Seed Act - Seed coating and priming technologies - Seed enhancement technologies.

UNIT – VII: CROP PROTECTION PRINCIPLES AND PRACTICES Importance of pest, disease, nematodes and weed management in agriculture – categories of pests, diseases, nematodes and weeds - Pest and disease surveillance and forecasting weather on pest and disease incidence - Symptoms of damages and control measures of pest, disease and nematodes of major crops in Tamil Nadu - Integrated pest, disease and nematode management in crop production - Pesticides and their use in IPM – Mode of action - Pattern - Plant protection equipments and their use - Plant quarantine. Storage pests, disease and nematodes and their management. Importance of biological control in pest, disease and nematode management. Weeds - Major weeds and their control.

UNIT – VIII: FARM BUSINESS AND FINANCE MANAGEMENT Farm business management - Principles of farm business management – Types and systems of farms-Classical production functions - Cost concepts - Management of resources - Farm Planning and budgeting - Investment analysis – Risk and uncertainties in agriculture - Agricultural credit system in India - Multi credit delivery system - Role of nationalized banks, NABARD and Regional Rural Banks - Lead Bank Scheme - Service area approach - Scale of finance-Credit Worthiness-3 Rs,5Cs and 7Ps of credit- Crop Insurance - Kisan Credit Cards (KCC) - Agricultural Insurance Company.

UNIT – IX: AGRICULTURAL MARKETING AND MARKET INTELLIGENCE Marketing - Agricultural marketing - Market structure – Marketing efficiency - Price SpreadMarket Integration-Market Risk-Speculation and hedging - Market Institutions- Warehouses and rural godowns - Agmark-Cooperatives - Commodity Boards – Agri business management – Principles of Management-Entrepreneurship Development - Forms of Business organizations - Agricultural Price Policy - CACP-MSP - FRP- Procurement PricePolicies for agricultural development - Economic liberalization - WTO and its impact on agricultural export - Importance of Agriculture in Indian economy - Land size and distribution of holdings and land use pattern in Tamil Nadu - Agriculture under Five year Plans (FYPs) - Food Security - Public Distribution Systems (PDS) - Buffer Stock.

UNIT - X: AGRICULTURAL EXTENSION: PRINCIPLES AND METHODS Extension methods for transfer of technology - AV aids-Communication models - Use of ICT in transfer of technology-Diffusion and adoption- Pre and post independence rural development initiatives: key features, strength and weakness of individual programmes - Programme planning and

evaluation methods- Rural sociology - Key features of Indian rural system Value system-Social change- Rural migration. Role of women in agriculture.

PAPER-II GENERAL STUDIES (DEGREE STANDARD)

UNIT - I: GENERAL SCIENCE Physics Universe-General Scientific laws-Scientific instruments-Inventions and discoveries National scientific laboratories-Science glossary-Mechanics and properties of matter-Physical quantities, standards and units-Force, motion and energy-Electricity and Magnetism, Electronics and Communication -Heat, light and sound-Atomic and nuclear physics-Solid State Physics – Spectroscopy- Geophysics - Astronomy and space science. Chemistry Elements and Compounds-Acids, bases and salts-Oxidation and reduction Chemistry of ores and metals-Carbon, nitrogen and their compounds-Fertilizers, pesticides, insecticides-Biochemistry and biotechnology-Electrochemistry-Polymers and plastics. Botany Main concepts of life science-The cell-basic unit of life-Classification of living organism-Nutrition and dietetics-Respiration-Excretion of metabolic waste-Biocommunication. Zoology Blood and blood circulation-Endocrine system-Reproductive system-Genetics the science of heredity-Environment, ecology, health and hygiene, Bio- diversity and its conservation-Human diseases-Communicable diseases and non- communicable diseases prevention and remedies Alcoholism and drug abuse-Animals, plants and human life.

UNIT - II: CURRENT EVENTS History Latest diary of events – National symbols-Profile of States-Defence, national security and terrorism-World organizations-pacts and summits Eminent persons & places in news Sports & games-Books & authors - Awards & honours-Cultural panorama-Latest historical events - India and its neighbours - Latest terminology-Appointments-who is who? Political Science 1. India's foreign policy 2. Latest court verdicts – public opinion 3. Problems in conduct of public elections 4. Political parties and political system in India 5. Public awareness & general administration 6. Role of voluntary organizations & govt., 7. Welfare oriented govt. schemes, their utility Geography Geographical landmarks-Policy on environment and ecology. Economics Current socio-economic problems-New economic policy & govt. sector Science Latest inventions on science & technology-Latest discoveries in Health Science Mass media & communication.

UNIT - III: GEOGRAPHY Earth and Universe - Solar system-Atmosphere hydrosphere, lithosphere - Monsoon, rainfall, weather and climate - Water resources - Rivers in India Soil, minerals & natural resources - Natural vegetation - Forest & wildlife Agricultural pattern, livestock & fisheries -Transport including Surface transport & communication - Social geography –

population -density and distribution-Natural calamities – disaster management-Climate change - Impact and consequences - Mitigation measures - Pollution Control.

UNIT - IV: HISTORY AND CULTURE OF INDIA Pre-historic events -Indus valley civilization-Vedic, Aryan and Sangam ageMaurya dynasty Buddhism and Jainism-Guptas, Delhi Sultans, Mughals and Marathas-Age of Vijayanagaram and the Bahmanis-South Indian history - Culture and Heritage of Tamil people-Advent of European invasionExpansion and consolidation of British rule - Effect of British rule on socioeconomic factors-Social reforms and religious movements - India since independence Characteristics of Indian culture-Unity in diversity – race, colour, language, custom-India-as secular state-Organizations for fine arts, dance, drama, music-Growth of rationalist, Dravidian movement in TNPolitical parties and populist schemes-Prominent personalities in the various spheres – Arts, Science, literature and Philosophy – Mother Teresa, Swami Vivekananda, Pandit Ravishankar, M.S.Subbulakshmi, Rukmani Arundel and J.Krishnamoorthy etc.

UNIT - V: INDIAN POLITY Constitution of India - Preamble to the constitution- Salient features of constitution- Union, State and territory- Citizenship-Rights and dutiesFundamental rights-Fundamental dutiesHuman rights charter- Union legislature – Parliament- State executive- State Legislature – assemblyStatus of Jammu & Kashmir- Local government – panchayat raj – Tamil NaduJudiciary in India – Rule of law/Due process of law- Indian federalism – center – state relations-. Emergency provisions- Civil services in IndiaAdministrative challenges in a welfare state- Complexities of district administration- Elections - Election Commission Union and State. Official language and Schedule-VIII- Amendments to constitution- Schedules to constitution-. Administrative reforms & tribunals- Corruption in public lifeAnti-corruption measures – Central Vigilance Commission, lok-adalats, Ombudsman, - Comptroller and Auditor General of India- Right to information - Central and State Commission- Empowerment of womenVoluntary organizations and public grievances redressal- Consumer protection forums.

UNIT - VI: INDIAN ECONOMY Nature of Indian economy-Need for economic planning-Five-year plan models-an assessment-Land reforms & agriculture-Application of science in agriculture Industrial growth-Capital formation and investment-Role of public sector & disinvestment-Development of infrastructure- National income- Public finance & fiscal policy- Price policy & public distributionBanking, money & monetary policy- Role of Foreign Direct Investment (FDI)- 18 WTO-globalization & privatization- Rural welfare oriented programmesSocial sector problems – population, education, health, employment, poverty-HRD

– sustainable economic growth- Economic trends in Tamil Nadu -Energy - Different sources and development Finance Commission - Planning Commission- National Development Council.

UNIT - VII: INDIAN NATIONAL MOVEMENT National renaissance-Early uprising against British rule-1857 Revolt- Indian National Congress-Emergence of national leaders-Gandhi, Nehru, Tagore, Nethaji -Growth of militant movements -Different modes of agitations-Era of different Acts & Pacts-World war & final phase struggle-Communalism led to partition-Role of Tamil Nadu in freedom struggle - Rajaji, VOC, Periyar, Bharathiar & Others-Birth of political parties /political system in India since independence.

UNIT - VIII: APTITUDE AND MENTAL ABILITY TESTS Conversion of information to data- Collection, compilation and presentation of data - Tables, graphs, diagrams-Parametric representation of dataAnalytical interpretation of data - Simplification-Percentage-Highest Common Factor (HCF)-Lowest Common Multiple (LCM)- Ratio and Proportion-Simple interest-Compound interest-Area-Volume-Time and Work Behavioural ability -Basic terms, Communications in information technology-Application of Information and Communication Technology (ICT)- Decision making and problem solving Logical Reasoning-Puzzles-Dice- Visual Reasoning-Alpha numeric Reasoning-Number Series-Logical Number/Alphabetical/Diagrammatic Sequences.

ASSISTANT AGRICULTURAL OFFICER SYLLABUS

Unit -I -Agronomic principles, practices and meteorology Agriculture – Definition – Scope of agriculture in India and Tamil Nadu - Branches of agriculture – Agronomy – Art and Science of Crop Production. Agronomical classification of crops – their importance. Major crops of India and Tamil Nadu. Factors affecting Crop Production – Moisture, Aeration, Light, Temperature and Nutrients. Cropping systems – definitions, Principles. Principles and Practices of Agricultural Operations – Tillage and Tilth – Objectives and Types of Tillage – Primary tillage, Secondary Tillage and Intercultural Operations, Implements and Tools in Agriculture. Meteorology – Agricultural Meteorology – Definition - Importance in Crop Production - Atmosphere – Components and its importance – Weather Parameters and their role in Crop Production. Rainfall – Spatial and Temporal Variability in Tamil Nadu across Seasons – Agro Climatic Zones of Tamil Nadu Irrigation – sources of water for irrigation – water movement,– soil moisture constants – available soil moisture - effect of water stress on crop yield – water use efficiency – water requirement of major crops – critical stages of water requirement – irrigation scheduling – types and advantages – Irrigation methods – Irrigation water use efficiency –

management of poor quality irrigation water - soil erosion due to water and control. Weeds – definition and importance of weed control in crop production – classification of weeds – methods of weed control – manual, mechanical, cultural, chemical and biological methods – relative merits and demerits – Herbicide classification based on mode of action and method of application – common herbicides available in the market– weed control practices for major crops – parasitic, problematic and aquatic weed management - integrated weed management – concepts and practices. Agronomic Practices including Climatic and Soil Requirement, Land Preparation – Seeds and Sowing – Varieties – Fertilizer Management – Irrigation – Weed Control – Harvesting – Cropping Systems for Cereals, Millets, Pulses, Oilseeds, Commercial Crops, Forages and Green Manure Crops. Cultivation of Mulberry Crop 2

Unit-II -Dry Farming and Agro-Forestry Dry Farming – Definition and Present Status in Tamil Nadu – Soils of Dry Farming Tracts and their limitation to Crop Production – Major Crops of Dry Land. Suitable Dry Land Technology for increased Crop Productivity – Pre-monsoon sowing – Conventional Crop Production Vs Alternate land Use in Dry Land – Integrated Farming Systems in drylands. Erosion - Classification of Erosion – Water and Wind Erosion – Land Slide – Contour Bund, Graded Bund, Bench Terrace, Contour Stone Wall. Gully Control Structures – Cultivation Practices – Water Harvest – Farm Ponds – Percolation Ponds –Weather aberrations and Contingent Crop Planning – Important Drought Events in Tamil Nadu and their effect on Crop Production; Watershed development – definition and components Land use classification – Role of Forests – Indian forests – Status – Classification – Disciplines in Forestry – Agroforestry – Definition – Differences between Agroforestry, Social Forestry, Urban Forestry – Advantages – Agroforestry Systems – Primary Systems – Agrisilviculture, Silvipasture, Agrisilvipasture – Mixed Wood Lots – Sub Systems – Shifting Cultivation – Taungya – Home Gardens – Alley cropping – Wind Break and Shelter Belts – Agroforestry Practices. Constraints in Agroforestry – Trees for Problem Soils – Sand – Sand Dune Stabilisation – Social Forestry Projects in Tamil Nadu –Industrial Agroforestry – Waste land development – types of wastelands and management practices. Management Practices for Multi Purpose Trees (MPT) – Teak, Casuarina, Ailanthus, Neem, Bamboo, Acacia

Unit-III -Soils and Fertility Management Definition of Soil – Its main components – Soils of Tamil Nadu. Soil Physical Properties – Colour, Texture, Structure, Bulk Density, Pore Space, Soil water, Soil Air, Soil Temperature and their significance in crop production. Soil Chemical Properties – Soil Colloids – Ion-exchange Reactions – Soil Organic Matter and its decomposition – Carbon and Nitrogen Cycles – Soil Micro Organisms – Importance of Organic

Matter on Soil Properties. Soil Reaction – Acid, Saline and Alkaline Soils – Their Formation and Reclamation – Soil Pollutants. Soil Fertility – Major, Secondary and Minor Plant Nutrients. Soil Fertility evaluation, Soil Testing and fertilizer recommendations. Fertilizers – Nitrogenous, Phosphatic and Potassic Fertilizers – Complex and Mixed Fertilizers, Efficient use of Fertilizers. Bio-Fertilizers – Groups of Bio-Fertilizers – Bacterial, Fungal, Algal and Azolla. Irrigation water – Qualities of irrigation water - Water testing 3

Unit-IV- Horticultural Crop Cultivation Techniques Study of Cultural Practices of the following Fruit Crops with reference to Soil, Climate, Varieties, Methods of Propagation, Cultural, Manurial, Horticultural and Irrigation practices – physiological and nutritional disorders - Training and Pruning – Role of Growth Regulators – Maturity Standards – Methods of Harvesting – Yield. Post harvest Technology – Grading – Packing – Storage. Tropical fruits:- Mango, Banana, Grapes, Papaya, Sapota, Guava, Citrus, Pomegranate, Ber, Annona, Amla and Jack. Subtropical and Temperate fruits: Apple, Pear, Peach, Plum and Pineapple. Propagation methods – sexual, asexual and micro-propagation – merits and demerits – steps in micro-propagation – packing and marketing of tissue culture plants Importance of Vegetables – Nutritive Value – Types of Vegetable Garden: Kitchen Garden, Nutritional Garden, Truck Garden, Commercial Garden – Soil and Climatic Requirements, Varieties, Cultural Practices, Irrigation, weeding – use of growth regulators, manuring, Harvesting, Yield and Post Harvest Handling of Tomato, Brinjal, Chillies, Bhendi, Onion, Cucurbits; Temperate Vegetables like Cauliflower, Cabbage, Turnip, Knol-khol; Salad Vegetables; Root and Tuber vegetables; Greens and Perennials – Tissue Culture achievements in Vegetables. Cultural Requirements of Commercial Flower Crops – Jasmine, Rose, Chrysanthemum, Marigold, Tuberose, Crossandra, Cockscomb. Garden Design – Formal and Informal Gardens – Components of Garden – Lawns and Lawn Making – Study of Important Flowering Annuals, Flowering and Foliage Shrubs – Flowering and Foliage Trees – Creepers and Climbers – Cacti and Succulents – Indoor Plants and Indoor Decoration – Cut Flowers – Flower arrangement – Bonsai Culture and dry flower decoration. Preparing ornamental garden design for home – Lawn Making; Different Methods of Lawn Making – Identification of Important Annuals, Herbaceous, Perennials, Shrubs, Trees, Cacti and Succulents, Creepers and Climbers, Bulbous Plants and Hedge Plants – Preparation of Pot Mixture – Potting and Repotting Exercise – Raising Nursery for Ornamental Plants – Flower Arrangement – Interior decoration – Bonsai Practices Definition – Area and Production – Soil, Climate, Varieties, Propagation, Cultural, Manurial and Irrigation Practices, Training and Pruning, Harvesting, Yield, Processing, Grading and Packing, Value added Products of : Spices

– Pepper, Cardamom, Clove, Nutmeg, Cinnamon, Allspice, Turmeric, Ginger, tamarind, Coriander and Fenugreek. Plantation Crops – Coffee, Tea, Coconut, Arecanut, Cashew, Cocoa and Rubber. Medicinal Crops – Coleus, Gloriosa, Ashwagandha, Senna, Keezhanelli, Agave, Thulasi and Achorus.

Unit-V -Breeding and Seed Production Field Crops – Importance – Classification – Agricultural and Industrial – Chemical Composition of Economic Parts in the Crops & Cereals, Millets, Pulses, Oilseeds, Fibres, Sugar and Starch Crops. Plant Photosynthesis – Respiration – Translocation of Assimilates. Reproductive and Pollination System in Plants – Mechanisms promoting Self Pollination and Cross Pollination in crop plants – Genetic Conservation and utilization. Breeding Techniques for Self Pollinated Crops – Pure line selection – Mass Selection – Hybridization and Selection – Pedigree Method – Bulk Method – For Crops like – Rice, Sorghum, Black gram, Groundnut. Breeding Techniques for Cross Pollinated and Often Cross Pollinated Crops – Mass Selection, Heterosis Breeding – Development of Hybrids – Single Cross – Double Cross and Poly Cross – Use of Male Sterile lines for Hybrid Seed Production – Synthetics and composites for crops like Maize, Cumbu, Redgram, Cotton, Castor, Sunflower, Coconut. Breeding Methods for vegetatively propagated crops – Clonal Selection – Hybridization and selection for crops like Sugarcane, Tapioca and Potato. Mutation in crop improvement – Polyploid in Crop Improvement – Inter Specific Hybridization. Seed – Importance – Seed Quality Characteristics – Classes of Seed – Nucleus, Breeder, Foundation and Certified Seed – Guidelines for Seed Production – Multiplication Ratio – Seed Certification, general certification standards – Field Inspection – Methodology for Certification – Seed Standards – Floral biology – Pollination and Role of Insects, Environmental and Edaphic Factors. Seed Production Techniques for Varieties and Hybrid in Rice, Sorghum, Maize, Cumbu, Pulses, Cotton, Oilseeds and Important Vegetables: Tomato, Brinjal, Chillies, Bhendi, Lablab and Cucurbits. Harvesting, Processing, Treatment, Storage, Seed Health and Marketing.

Unit-VI -Plant Protection Principles and Practices Insects - Definitions – Characters of Insects – Elementary knowledge of Insect – Dominance of Insects; Mouth Parts – Wings – Legs. Economic Classification of Insects – Sericulture – Rearing of Mulberry silk worms – Apiculture – Role of Bees in Crop Productivity – Hiving Bees and Apiary Management. Beneficial Insects – Insect Pollinators – Predators and Parasitoids. Pest – Definition – Categories of Pests – Pest outbreak – Pest Monitoring – Pest Surveillance – Forecasting – Economic Threshold Level – Economic Injury Level. Pest Management Components – Cultural, Physical, Mechanical, Legal and Integrated Methods – Use of Resistant Varieties, Biological Control – Parasitoids, Predator

and Microbial Agents. 5 Pesticides – Groups, Classification, Mode of Action – Formulation and Uses, Principles of Pesticides application – Hazards in the use of Pesticides and Environmental Pollution – Safe Handling of Pesticides – Pesticide residue - Behavior modifying chemicals – Use of Pheromones in pest management and behavioral modifying chemicals; approach. Damage symptoms - life cycle and management practices of insect and non insect pests of Rice, Sorghum, Maize, Cumbu, Ragi, Cotton, Sugarcane, Pulses, Groundnut, Castor, Gingelly, Sunflower, Brinjal, Tomato, Bhendi, Cucurbits, Crucifers, Moringa, Tapioca, Chillies, Onion, Coconut, Arecanut, Turmeric, Curry-leaf, Coffee, Tea, Cardamom, Pepper, Betelvine, Flower crops, Mango, Citrus, Banana, Grapes, sapota, Guava, Pomegranate, Pests of stored materials and their management Plant diseases – definition, Causes of plant diseases – Fungi, Bacteria, Viruses and Mycoplasma – Categories of plant diseases – Mode of spread – Environmental factors influencing diseases out breaks. Control exclusion – Eradication – Immunization – Protection – Cultural – Methods of Control– Bio control – Economics of the new technologies, Useful fungi – mushroom, cultivation of Oyster mushroom, Trichoderma - utility. Characteristics of an ideal fungicide – Care in handling fungicides – Major groups – Formulation and Applications – Phytotoxicity – Precautions in using fungicides – Antibiotics in plant disease management. Bio technology and its application in disease management – Assessment of crop diseases and losses – Principles of management in Plant Disease Control - Integrated Pest Management in plant disease control. Major diseases caused by Fungi, Bacteria, Virus and Mycoplasma in Cereals (Rice, Sorghum, Maize, Cumbu, Ragi), Pulses (Red gram, Black gram, Green gram, Bengal gram, Cowpea, Lablab) – Oil seeds (Groundnut, Gingelly, Sunflower, Castor), Cash crops (Cotton, Sugarcane, Tobacco, Betelvine) – Fruits (Mango, Banana, Grapevine, Sapota, Pomegranate, Papaya) – Vegetables (Tomato, Chillies, Brinjal, Bhendi, Cucurbits, Crucifers, Onion, Garlic) – Plantation crops (Coffee, Tea, Rubber, Coconut, Arecanut) – Spices (Turmeric, Pepper, Cardamom, Coriander, Ginger) – Flowers (Rose, Jasmine, Crossandra, Chrysanthemum) and their management.

Unit-VII- Livestock, Poultry Management, Artificial Insemination and Calf Rearing Significance of livestock and poultry in Indian economy –Role of livestock and poultry in Indian agriculture – Various systems of livestock production – extensive – semi intensive – intensive – mixed – Integrated farming systems – Manure management methods – Definition of breed – classification of indigenous, exotic cattle and buffaloes – Breed characteristics of Sindhi, Kangeyam and Umblacherry, Jersey, Holstein Frisian, Murrah and Surti. Breeding – importance of cross breeding 6 Artificial Insemination – merits and demerits – Housing

management – farm site selection space requirement for calves, heifer, milch animal and work bullocks – Type and design of house. – Systems of housing – Single row system – Double row system – head to head and tail to tail – merits and demerits – Care and management of new born calf and heifers – Care and management of pregnant, lactating animals and work bullocks. Milk – Definition – clean milk production – methods of milking – hand and machine milking – Processing of milk – cooling Pasteurization – Definition – Various methods – Low Temperature Long Time and High Temperature Short Time – advantages and disadvantages. Nutrition – Definition – Ration – Balanced composition of concentrate feed for dairy animal, calf and work bullock – Requirement and importance of green fodder, carrying capacity and forage cycle. Diseases – classification – Viral, bacterial and metabolic – General control and preventive measures. – Viral Diseases – Foot and mouth – Bacterial diseases – Anthrax, Haemorrhagic septicemia and Black quarter – Metabolic – Tympanites, Ketosis and Milk fever – Mastitis and its control – Zoonotic diseases(Anthrax, Tuberculosis, Brucellosis and Rabies) – Prevention and control. Sheep and Goat farming – classification of breeds of Indian and exotic origin – Systems of rearing – Housing management – Type design – Floor diagram – Space requirement for adult and young stock –Nutrition – common tree Fodder for small ruminants – Common ailments of sheep and goat – Sheep pox – Foot and Mouth – Blue Tongue – Enterotoxaemia – Ecto and Endo parasites Systems of poultry rearing – Backyard, Intensive systems; Nomenclature of commercial layers and broiler strains – Care and management of day old chicks – Brooder management. Systems of housing – Deep litter and cage systems – merits and demerits – Raised platform housing – Floor space requirement – litter management – care and management of layers – Care and management of broilers. Poultry Nutrition – composition of chick mash grower, layer, broiler starter and finisher mashes – Feed Conversion Ratio / dozen eggs or kilogram of meat. Classification of Poultry diseases – Viral – Bacterial – Protozoan – Causative organisms, symptoms, causes and prevention – Viral diseases – Ranikhet disease - Infectious bursal disease – Bacterial disease – E. coli – Coryza – Salmonellosis – Protozoan – Coccidiosis – Vitamin and mineral deficiencies

Unit-VIII -Farm Machinery and Post Harvest Technology Farm houses – types – sewage disposal structures – cess pool. Bore hole – Septic Tank Structures – Dispersion Trenches – Soak pit. Gutters & Floorings – loose housing system – Feeding Sheds and Milking Sheds – Silos – types – pit silo, Trench silo. Poultry Structures – Location and Types. Poultry Equipments –Feeders and Waterers – Brooder House Details. – Thrashing Floor, drying floor. I.C. Engines – Types, Introduction – Preventive maintenance and minor repairs. Tractor –

Different systems of a tractor – Hydraulic system – Clutch and Transmission system – Hitching of implements to Tractor – Power Tiller – and matching Implements. Seeders and planters. Plant Protection equipment –Harvesting machinery. Agricultural Pumps – Types of pumps. Post Harvest losses in durable and Perishable crops – Moisture content – Methods of Determination – Drying – Sun Drying – Merits and Demerits – Mechanical Drying – Merits and Demerits. Shelling and Decorticatior – Rubber Roll Sheller – Centrifugal Dehusker . Parboiling of Paddy – Merits and Demerits – Polishing – Milling of Corn and Pulses – Principles and Methods – Seed Treater – Types of Seed Treater. Storage of Grains and Seeds – Condition for safe storage.

Unit-IX Energy and Environment Energy Resources and Forms of Energy – Conventional and Non Conventional Energy – Energy Scope. Solar Energy – Introduction – Application - Merits and Limitations of Solar Energy – Basic Approach and Objectives – Solar Constants. Wind Energy – Introduction – Merits and Limitations of Wind Energy Conversion – Basic Principles of Wind Energy Conversion – Classification of WEC Systems. Energy from Bio-Mass – Technologies – Classification and types of Bio-Gas Plants – Selection of Site – Bio-Gas from Plant Wastes – Problems related to Bio-gas Plants – Utilization of Bio-gas. Bio Fuel Plant – Gasifiers – Smokeless Chulas. Ecology – Natural resources – Soil, Water, Mineral, forest, wildlife resources – Ecosystems – Concepts – Productivity. Biosphere – Components and characteristics Environmental Pollution and Management – Atmospheric Pollution – Particulate emission by industries and automobiles – Smog – Acid rain – Ozone hole – Global Warming – Causes, Effects and Control measures – Noise pollution – Sources, Effects and prevention - Liquid and Solid Waste disposal – Waste water treatment – Waste recycling and resource recovery. Sustainable living resources: World food supply – Ecological Perspective in Agriculture – Traditional farming methods – Eco-Safe technologies in agriculture. 8 Food composition – Classification - functions. Physical properties of foods, food emulsion, foam and set. Cooking methods, sensory evaluation, fortification, additives. Nutrition and health – Classification of Carbohydrate, Protein, Fat and Fibre. Fat soluble and water soluble vitamins, minerals and trace elements. Assessments of nutritional status, Prevalence of malnutrition. National and International Organization

Unit X -Commercial Agriculture Bio-Control Agents, Mushroom Cultivation, Fruits and Vegetables Processing, Hybrid Seed Production, Nursery Technology, Organic Composting and Broiler Production Importance – History and development of bio-control agents - classical examples of biocontrol agents – Role in pest and disease management – Categories of bio-control agents. Setting up a bio-control laboratory. Mass culture of tobacco caterpillar

(*Spodoptera litura*) and gram pod borer (*Helicoverpa armigera*)- synthetic diet – mass production of SiNPV and HaNPV. Mass production of *Trichogramma* spp., *Chrysoperla*, coccinellid predators, *Trichoderma viride*, *Pseudomonas fluorescens* and Entomopathogenic nematodes Mushroom- importance-present production and trade, scope for export, mushroom products – Mushroom morphology : common edible mushrooms - *Pleurotus*, *Calocybe* - poisonous mushrooms - Laboratory techniques: equipments used, sterilization of glassware, media preparation, pure culture techniques, sub-culturing and storage. Spawn: types of spawn, mother spawn and bed spawn. Cultivation: Oyster mushroom, Milky mushroom – Problems in cultivation: weed moulds, diseases, pests and abiotic disorders - Uses of mushroom: as food, nutraceutical and pharmaceutical values, composting coir-pith and other agro-wastes – Post harvest technology: methods of preservation and value addition. Floor layout of Fruit and Vegetable processing Industry – Equipments and Accessories used in processing Industry – Preparation of Squash, Syrup, Cordial, Nectar, Ready to serve beverages (RTS) – Fruit juice concentrate – Paste, Powder, Bar – Jam, Jelly, Marmalade and Candy, Preserve – Pickles – Oil, Salt and vinegar – Tomato products – Ketch up. Sauce, Puree and Paste – Canning of Fruit and Vegetables – Dehydrated Fruit and Vegetables and Re-hydration – Preservation by low temperature – cut-out analysis of canned Fruit and Vegetables – Evaluation of Frozen Fruit and Vegetables – Osmotic dehydration Definition – Production of hybrids – Development of inbreeds – Single cross evaluation – Prediction of double cross performance – Production of hybrid seed – Cytoplasmic, Genetic male sterility – Maintenance of Male sterile lines – Production of single cross hybrids – Production of double cross hybrid varieties - Manual emasculation and / or Pollination – Chemically induced male sterility – Merits and demerits of hybrid varieties – Floral biology, anthesis, pollination, selfing, emasculation and crossing technique in Rice, Sorghum, Pearl millet, Red gram, Castor, Sunflower, Cotton, Tomato, Bhendi. Harvesting – Physical and chemical indices – Extraction techniques – Seed processing – Use of cleaner, grader – Seed treatment – Seed packaging – Seed storage – Sanitation – Certification procedure Selection of nursery area – preparation of seeds and seed treatment – Sowing and raising of rootstocks (Fruits and Flower Crops) – Application of Liquid Manure and plant protection of rootstock – Potting materials and Preparation of pot mixture – Potting of Rootstock and Hardening – Selection of Scion Plants and Grafting, Aftercare of Grafted Plants, Graft Separation and Hardening – Preparation of Cuttings of Ornamental Plants, Treating the Cuttings with growth regulators and Planting in Mist Chamber in Beds/Polybags, Potting of Rooted Cuttings and Hardening – Air Layering of Ornamental/Fruit Crops – Budding of Ornamental Plants (Rose) – Maintenance of Potted Plants – Packing and Marketing . Agricultural, Industrial and Urban

wastes - Nutrient potential of different organic manures – Preparation of FYM Compost – Composting methods - Preparation of enriched FYM – Coirpith composting – Sugarcane trash – Pressmud - Farm wastes and farm weeds - Parthenium composting – Determination of maturity indices of composts – Commercial utility of organic manures –Introduction to vermicompost – Types of Vermicompost - Materials for vermicomposting. Preliminary treatment of composting material – Small Scale vermicomposting – Large scale vermicomposting – Other types of vermicomposting – Requirements for vermicomposting – Bedding materials, container, pH, Moisture content, Temperature – Cover feed substrates - Selection of right type of worm species – Preparation of vermicompost beds – Collection of Vermicompost – Vermicompost efficiency – Transportation of live worms – Application of vermicompost Preparation of poultry house for receiving new chicks for broiler production – Disinfection – Sanitation procedures – Arrangement of Brooders, brooding, spreading of litter and medication – Medication schedule and vaccination - broiler chicks – Measures to control respiratory problems. Coccidiosis and their management problems – Feeding, watering, spacing – Management of litter – Use of growth promoters and feed additives – Improvement of feed intake and feed conversion efficiency – Composition of broiler feeds, feeding ages and consumption levels – Commonly used ingredients in feed mixing for broilers – Least cost feed formulation – Observation on feed consumption, use of stimulants – Recording of body weight of broilers during growth - Management of broilers during summer – winter –Common basic post mortem findings to know the cause of death – Dressing procedures to prepare ready to cook broilers – Various poultry meat preparations. Importance of artificial insemination. Basic study of the reproductive organs of a Bull/He-buffalo) – Fundamentals about semen production. Artificial vagina structure. Collection, processing for insemination – Basic knowledge about the Frozen semen straw production – Liquid Nitrogen – Cryocan – Handling of Cryocan – Storage of Frozen semen straws – Handling of Frozen semen straw – Visit to frozen semen production stations. Basic knowledge about the reproductive organs of cows/she-buffalo – Puberty – Oestrus cycle – Oestrus – Symptoms of heat – Stages of oestrus cycle-Standing heat – Identification of Animals in “Heat”-Management of animals in “Heat”. Examination of reproductive organs in slaughter house specimen – Repeated rectal examination of reproductive organs in animals going for slaughter –Artificial insemination technique — Non return to heat – Pregnancy examination – Study of various stages of pregnancy by rectal examination - Care and management of pregnant animals – Nearing calving animals – Calving.

Unit XI- Agrl.Extension and Agrl.Economics Rural Economics and Agricultural Economics – Meaning, importance and scope – Sectors of Economy - Importance of agriculture in rural economy: Problems of rural economy – Population growth and its consequences. Agents of production: Land distribution – Size of land holding – Man-Land ratio - Subdivision and Fragmentation – Land reform – Ceiling on land holding, Tenurial reforms, Consolidation of land holdings – Cooperative farming and Bhoodhan movement – Success and failure. Rural labour: Meaning – Classification – Characteristics of rural labour – agricultural labour – Employment, wages and income - Minimum wages act and other welfare measures. Rural Banking and Finance: Meaning and Concept – Classification and purpose – Sources of finance – Institutional and non-institutional – Government, cooperatives, nationalized commercial banks, regional rural banks and land development banks, private money lenders and other traditional sources – Establishment of NABARD and its role, Multi-agency, Service area approach. 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 – Potentials for development of agro- industries from agricultural products and wastes – Sugarcane, Cotton seed, Banana sheath, Forestry products – Rural technologies – Technology gap – Economic and social constraints in the spread of technology. Study of important and recent rural development schemes. Concepts and definition of marketing and agricultural marketing – Scope of agricultural marketing – Classification of Markets – Structure of markets. Characteristics of agricultural commodities: Small quantities, Bulkiness, Perishability, Varietal characteristics. Problems in grading and standardization. Marketing costs and marketing margins. Price spread. Advantages and problems. Cooperative agricultural marketing societies and regulated markets – Role of National Agricultural Cooperative Marketing Federation and TANFED. Role of specialized agencies viz., Food Corporation of India, Central Warehousing Corporation, State Warehousing Corporation in marketing of agricultural commodities and CCI. Price support programmes – Buffer stock operations – Role of Commission on Agricultural Costs and Prices – Price stabilization. Agmark grading and commercial grading – Marketing information and intelligence – Marketing of agricultural inputs viz., seeds, fertilizers, plant protection chemicals and implements. Sociology – Rural Sociology – Characteristics of rural society. Rural Youth – Their needs and aspirations. Basic rural institutions and voluntary agencies. Leadership – Classification, Characteristics and their influence. Motivation – Methods of Motivation. Social change. Adoption – Meaning, Stages, Adopter categories and their characteristics. Extension methods – Classification – Individual contact, group contact and mass contact methods. Extension aids – Audio aids, Visual aids and

Audio Visual aids. Print and Electronic media. Photography, new achievements in communication technology. Visit to a village – Identifying resources, conducting participatory rural appraisal (PRA), conducting SWOT (strengths, weaknesses, opportunities and threats) analysis and preparing action plan for village development. Visiting farmers – Analysis of farm resources and studying the life style of farmers, earnings, enterprises, expenditure pattern, technical information seeking behavior and dissemination of technologies. Finding the factors of adoption of technologies. Problem diagnosis study – visiting farmers' fields, identifying technical and frequent problems like soil, pest, disease, disorders and other problems in agriculture, obtaining solutions from known sources and providing them to the farmers . Visiting agro service centers – Studying the business techniques, farmers approach, distribution pattern, dealership pattern, knowing different agro chemicals available in markets and their prices, gaining experience in solving the farmers problems in agro service centers . Visiting daily vegetable wholesale markets and assessing the price fluctuation and preparing price trend calendar for different vegetables. Preparing line chart for maximum price of different vegetables grown in the district and identifying optimum sowing period for different vegetables. Study the potentialities, prospects and to get clear knowledge about starting agro industries.

Unit XII Computer Application Introduction to Computers – Hardware – Software – Operating systems – Windows operating systems – Word processing – MS Word – Data Entry using Excel – Charts – Graphs – Internet – E Mail – Multimedia Presentation – Application of computer in agriculture - Preparation of Tabular Columns, Charts and Graphs - Multimedia Presentation – power point - Internet and E- Mail and Application of computer in agriculture.