TAMIL NADU PUBLIC SERVICE COMMISSION

SYLLABUS

AGRICULTURE, CHEMISTRY, ZOOLOGY AND BOTANY

(DEGREE STANDARD)

CODE:518

UNIT I: Agriculture and its Principles: (20 Questions)

Area, production and productivity of crops in India and Tamil Nadu - Government Agricultural Policies – Role of NSC, FCI and PDS - Agricultural seasons, cropping patterns and agro climatic zones of India and Tamil Nadu – Package of practices of different crops – Classification of stress and mitigating technologies - Nanoparticles and their applications – Natural farming - Organic certification and standards – Drone technology in Agriculture. Soil health - Problem soils and their management - Soil survey - Its objectives and scope – Soil fertility and productivity – Soil testing – Integrated Nutrient Management. Quality of irrigation water - Its effect in soil and crops – Chemistry of Macro and Micro Nutrient - Physiological disorders in crop plants and their management – Energy in Agricultural production - Sources-Solar, wind, animal, biomass and biogas – Agricultural implements and Machineries and their usage.

UNIT II : Crop Improvement (25 Questions)

Principles of breeding - Breeding methods in self, cross and vegetatively propagated crops - Modern tools in crop improvement – Heterosis breeding and Hybrid seed production technologies – Synthetic and composites – Breeding for biotic, abiotic and quality traits. Latest varieties of major crops in Tamil Nadu – Variety release procedures - Application of biotechnology in Agriculture - Tissue culture & its significance – Transgenic Plants - Marker assisted selection – Markers - Plant Genetic Resources Collection conservation and exchange - Crop

varietal protection - PPV& FR authority and its role. Seeds – Importance of quality seeds in Agriculture – Nucleus, Breeder, foundation, certified and labeled seeds – Characterisation of good quality 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 **–** Varietal deterioration of crops – causes and maintenance – Post harvest handling of seeds.

UNIT III : Crop Protection Principles and Practices (25 Questions)

Importance of pest, disease, nematodes and weed management in agriculture – categories of pests, diseases, nematodes and weeds - Migratory pests – Pest and disease surveillance and weather forecasting on pest and disease incidence - Symptoms of damages, biology 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 – 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 – Pollinators and their safety – Banned and next generation agro chemicals - Fumigation methods - Insecticide residue and MRL.

UNIT IV: Farm Business Management and Economics (20 Questions)

Farm business management - Costconcepts - 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 - Crop Insurance - Kisan Credit Cards (KCC) – Agricultural marketing – Market structure – Marketing Efficiency - Market Risk - Speculation and hedging - Market Institutions - Warehouses and rural go downs – Agmark - Cooperatives - Commodity Boards – Agri business management – Farmer Producer Organisations and Agri-business incubation - Agricultural Price Policy - CACPMSP – FRP - Procurement Price - Policies for agricultural development – International trading in agricultural commodities - Food Security - Public Distribution Systems (PDS) - Buffer Stock - Extension methods for transfer of technology – AV aids – Communication methods - Rural sociology- Social organisations and Non-Governmental organisations – Developmental programs by ICAR / Government – e-Agriculture and Digital Tools.

UNIT V: ANALYTICAL CHEMISTRY AND FERTILIZERS (20 Questions)

Preparation of standard solutions – Indicators, Buffer solutions, Molarity, Normality – Principles of Volumetric Analysis - Different types of titrations – Gravimetric Analysis – Basics principles and instrumentation of column, TLC, Gas Chromatography and HPLC.

Preparation, properties and uses: Urea, Ammonium Nitrate – Calcium ammonium nitrate, ammonium phosphate and super phosphate

UNIT VI: CARBOHYDRATES AND AMINO ACIDS (15 Questions)

Carbohydrates: Classification, Sources, Preparation and reactions – Glucose, Fructose, Sucrose and lactose – Structure of glucose and fructose.

Amino Acids: Classification – Zwitter ion – peptide linkage – Structure of proteins

UNIT VII: Systematic Botany (20 Questions)

General features, structure, reproduction and economic importance of Algae, Bryophytes, Pteridophytes and Gymnosperms. General characters,

occurrence, mode of nutrition and reproduction of fungi. Harmful effects of fungi on plants. General symptoms and control measures of viral, bacterial and fungal diseases. Whittaker's five kingdom classification. Koch postulates. Disease cycle culture of microorganisms pure and batch culture. Morphological features and modifications of Leaves, Flower and Inflorescence, fruits, stem and root. Botanical nomenclature – rules and typification. ICNAFP. APG system of classification. Influence of biotic and abiotic factors on vegetation. Eco system and its components. Pollution types and its control measures. Natural Disaster Management. Biodiversity and its conservation.

UNIT VIII: Developmental Botany (20 Questions)

Meristems and Tissues (Simple and Complex). Structure and development of Anther and Ovule. Double fertilization and Triple fusion seed – Structure, germination, viability and dormancy. Ultrastructure of prokaryotic and Eukaryotic cell. Morphology, types and functions of chromosomes. Mendelian genetics. Sex determination in plants. Absorption of water and minerals mineral nutrition in plants. Physiological role of growth regulators photosynthesis – Light and Dark reaction. Respiration – types, Kerb's and glycolysis, CAM pathway.

UNIT IX: Non-Chordataand Chordata: (15 Questions)

Non-Chordata: General organization - Classification upto classes. Prochordata - Amphioxus. Chordata - General organization- outline classification upto class level. Symmetry and Coelom. Outline classification of insects - Morphology, mouthparts, and life cycle - Hormonal development - Social life in insects - Beneficial and harmful insects – Traps and their types in godown - Physical, chemical, biological and pheromone traps.

UNIT X: Physiology and Biochemistry (20 Questions)

Biochemistry: Biomolecules - Structure and functions of carbohydrates, Proteins and lipids. Physiology: Digestion, Nutrition, balanced diet and

assimilation. Composition of blood. Nerve impulses and conduction. Cell Biology: Cellular organelles - Structure and functions - DNA structure and function and replication. Immunology: Types of immunity, antigen and antibody- Vaccination. Genetics: Sex chromosomes - Genetic disorders. Developmental Biology: Gametogenesis - Fertilization. Environmental Biology: Ecosystem, structure and functions - Intra and inter specific association. Evolution: Theories of evolution - Mimicry in Evolution - Fossils and Human evolution.

Dated: 20.02.2025