

SYLLABUS

ENTRANCE EXAMINATION 2022-23

(FOR ADMISSION TO MASTER DEGREE PROGRAMMES IN AGRICULTURE)

NOTE: The Entrance Test will consist of 100 (Hindered) Multiple choice Questions of ONE mark each and will be of TWO hours duration.

UNIT-I: Plant Pathology, Plant Breeding & Genetics:

Mendelian principles of heredity, chromonemata, chromomeres, centromere, secondary constriction and telomere; special types of chromosomes, Multiple alleles, pleiotropism and pseudoalleles. Sex determination and sex linkage, sex limited and sex influenced traits, Structural and numerical variations in chromosomes and their implications, Nature, structure & replication of genetic material, self – incompatibility and male sterility, components of Genetic variation, breeding methods in self and cross pollinated crops and handling of segregating population, Genetic basis and methods of breeding cross pollinated crops, modes of selection, Heterosis and inbreeding depression, composite and synthetic varieties, Wide hybridization and pre-breeding, Polyploidy in relation to plant breeding, mutation breeding, DNA markers and marker assisted selection, Intellectual Property Rights, Plant genetic resources, Study of genetics of qualitative and quantitative characters, Ideotype concept, approaches for development of hybrid seeds and varieties.

Structure and function of cell organelles, mitosis and meiosis; Characteristics of prokaryotic and eukaryotic organisms, Major pests and disease of rice, wheat, cotton, chickpea, sugarcane and their management. Classification and characters of fungi, bacteria, Mycoplasmas and viruses. Libration/ dispersal and survival of Plant pathogens. Principles and methods of plant disease management. integrated diseases management; sterilization, disinfection and pasteurization, Koch's postulates; etiological agents of rusts, smuts, powdery/downy mildews, wilts, yellows, mosaic, necrosis, enations, blights and witches- broom.

Foundation and certified seed production of important cereals, pulses, oilseeds, fodder and vegetables. Seed drying, processing and their steps, seed testing for quality assessment, Seed storage; general principles, stages and factors affecting seed longevity during storage. Measures for pest and disease control during storage.

UNIT-II Soil Science & Agricultural Chemistry:

Soil as a medium for plant growth, composition of earth's crust, weathering of rocks and minerals, components of soil- their importance, soil profile, Soil, physical properties- density, porosity, texture, soil structure and their brief descriptions. Rheological properties in soils, calculations of porosity and bulk density. Soil air- Aeration, causes of poor aeration, factors affecting aeration, importance for plant growth. Soil temperature - sources and losses of soil heat. Factors affecting soil temperature, its importance in plant growth. Soil water- structure of water, soil-water-energy relationship, classifications, surface tension and movement in soil. Soil colloids- properties, structure of silicate clay minerals, buffering of soils. Problem soils- acid, saline, sodic and acid sulphate soils – their characteristics, formation, problems and management. Irrigation, water quality and its evaluation. Waterlogged soils- basic features, distinction with upland soils. Essential plant nutrients- criteria of essentiality, functions for plant growth, mechanisms for movement and uptake of ions in soils and plants, Forms of nutrients in soils, deficiency symptoms on plants, luxury consumption, nutrient interactions and chelated micronutrients. Soil fertility, evaluation and management for plant growth, soil testing and fertilizer recommendations. Soil classifications- diagnostic surface and sub- surface horizons, soil survey- types, objectives, uses, land capability classifications. Remote sensing and its application in agriculture, SIS, GIS and GPS- basic features and uses in agriculture, Elementary concepts of radio isotopes and uses in agriculture. Soil micro-organisms, Classifications and their roles. Organic matter- decomposition, C:N ratios, mineralization and immobilization processes,

humus, role of organic matter in soil quality. Soil erosion, types and control measures. Fertilizers and manures- classifications, NPK fertilizers, their reactions in soils, green manuring, recycling of organic wastes, composting. Soil and water pollution- sources, brief idea about different pollutants in soils and their managements. Pesticides, their classification and uses; biopesticides and botanical pesticides.

UNIT-III: Entomology:

Insect integument, body segmentation, moulting and metamorphosis; General morphology and anatomy of insects; Modifications of antennae, mouthparts, legs and wings; Physiology of major insect organs; Taxonomic Categories; Binomial nomenclature; Classification of phylum Arthropoda up to classes and classification of class Insecta up to orders and families of economic importance; Effects of biotic and abiotic factors; Diapause; Population dynamics; Classification, distribution, host range, biology, nature of damage and management of pests of field crops, vegetable crops, fruit crops, plantation crops and stored grains; Methods for estimation of pest populations and damage; Principles and methods of pest control; Concept of economic thresholds; Integrated pest management; Classification, mode of action, toxicity and formulations of insecticides; Insecticide resistance and its management; Recent advances in pest control; Pesticide appliances and their management; Beneficial insects- honey bees, silkworm, lac insect, predators, parasitoids, pollinators.

UNIT-IV: Agronomy:

Agricultural Meteorology: Agronomy –meaning and scope, National & International agricultural research institutes in India, Agro climatic zones of India, Tillage, crop stand establishment and planting geometry and their effect on crop, Physiological limits of crop yield and variability in relation to ecological optima, organic farming, Precision farming, Integrated farming systems, climate shift and its ecological implications, Greenhouse effect, Climatic factors and their effect on plant processes and crop productivity, atmosphere, Solar radiation, Field crops: Origin, distribution, economic importance, soil and climatic requirement, varieties, cultural practices and yield of cereals (rice, wheat, maize, sorghum,), pulses (chickpea, lentil, peas, Pigeon pea, mungbean), oilseeds (groundnut, sesame, soybean, rapeseed & mustard, sunflower), fiber crops (cotton, jute, sun hemp), sugar crops(sugarcane), fodder & forage crops (sorghum, maize, napier, berseem, Lucerne, oats), Principles of weed management, Classification, biology and ecology of weeds, crop weed competition and allelopathy, concepts and methods of weed control, Integrated weed management, Classification, formulations, selectivity and resistance of herbicides, Herbicide persistence in soil and plants, Application methods and equipments, Weed flora shifts in cropping systems, Weed management in field crops. Principles of irrigation, Water and irrigation requirements, Concepts and approaches of irrigation scheduling, Methods of irrigation, Measurement of irrigation water, application, distribution and use efficiencies, Conjunctive use of water, Irrigation water quality and its management, water management in major field, crops (rice, wheat, maize, groundnut, sugarcane) Agricultural drainage. Essential plant nutrients and their deficiency symptoms, concept of essentiality of plant nutrients, Indicators of soil fertility and productivity, Fertilizer materials and their availability to plants, slow release fertilizers, Nitrification inhibitors, Principles and methods of fertilizer application, Integrated nutrient management, site specific nutrient management. Characteristics of Dryland farming and delineation of Dryland tracts, constraints of Dryland farming in India, Types of drought and their management, contingency crop planning and mid- season corrections for aberrant weather and its recycling. Watershed management. Problem soils : Problem soils and their distribution in India, Characteristics and reclamation of these soils, Crop production techniques in problem soils. Sustainable agriculture: parameters and indicators, Conservation agriculture, Agro-forestry systems, shifting cultivation, Alternate land use systems, Wastelands and their remediation for crop production.

UNIT-V: Agricultural Economics:

Theory of consumer behavior, theory of demand, elasticity of demand, theory of firm, cost curves, theory of supply, price determination, market classification, National Income. Basic principles of farm management, concept of farming system and economics of farming systems, agricultural production economics-scope and analysis, factor-factor relationship, product-product relationship and factor-product relationship, marginal cost and marginal revenue, farm planning and budgeting, Agricultural finance: nature and scope. Time value of money, Compounding and discounting. Agricultural credit: meaning, definition, need, classification. Credit analysis: 3R's, 5C's and 7 P's of credit, repayment plans. History of financing agriculture in India. Commercial banks, nationalization of commercial banks. Lead bank scheme, regional rural banks, scale of finance. Higher financing agencies, RBI, NABARD, AFC, Asian Development Bank, World Bank, role of capital and credit in agriculture; credit institutions, co-operatives and agrarian reforms in India.

Role of marketing in agriculture development, marketed surplus and marketable surplus. Function of marketing-buying and selling, storage, processing, transportation, packaging, grading, quality control, marketing channels, market integration-vertical and horizontal, marketing efficiency, cost and price spread. Public sector institution-CWC, SWC, FCI, CACP, DMI-their objectives and functions.

UNIT-VI: Agricultural Extension & Communication:

Extension Education- concept, meaning, principles, philosophy, scope and importance; Extension programme planning and evaluation- steps and principles, models of organizing agricultural extension; historical development of extension in USA, Japan and India. Rural development, meaning, importance and problems; Rural development programmes in India- Pre-independence era to recent ones; Extension teaching methods, definition and concept of sociology, differences between rural & urban communities, social stratification, social groups, social organization and social change. Rural leadership, educational psychology- learning and teaching, role of personality in agricultural extension Indian rural system- its characteristics; value system, caste and class; structure and customs; rural group organization and adult education.

Communication, principles, concepts, process, elements and barriers in teaching methods. Different kinds of communication methods and media and AV aids/materials. Cyber extension, Kisan Call Centers, teleconferencing, agriculture journalism, diffusion and adoption of innovations- adopter categories. Capacity building of extension personnel and farmers- training to farmers, women and rural youth.

UNIT-VII: Horticulture:

Layout and establishment of orchards; pruning and training; propagation, climatic requirement and cultivation of fruits like mango, banana, citrus, guava, grape, pineapple, papaya, apple, pear, peach and plum; cultivation of plantation crops like coconut and cashew nut and spices like black pepper, coriander, turmeric, important physiological disorders; major vegetable crops of tropical, subtropical and temperate regions like cole crops (cauliflower, cabbage and knol khol), cucurbits (pumpkin, bottlegourd, bittergourd, luffa, muskmelon and watermelon, cucumber), root crops (radish, tapioca, sweet potato and potato), leafy vegetables (fenugreek and spinach); solanaceous crops (tomato, chillies and brinjal); techniques for raising the nursery; nutritive value of fruits and vegetables and their role in human nutrition; basic physiology of ripening in fruits and vegetables and their products; type of fruits and vegetable products and control of fungal and bacterial diseases; major floricultural crops grown in India for commercial purposes like rose, carnation, chrysanthemum, marigold, tuberose, gladiolus, orchids; establishment and maintenance of lawns, trees, shrubs, creepers, hedges and annuals; type of gardens, methods of crop improvement; male sterility and incompatibility; pure line and pedigree selection; backcross, mass selection; heterosis; plant nutrients, deficiency symptoms of nutrients, manures and fertilisers, systems of irrigation, management of important pests and diseases of fruits and vegetables.