RECRUITMENT TO THE GRADE – III MEGHALAYA AGRICULTURAL SERVICE

Syllabus for the Written Examination:

PAPER – I : (100 marks)

1. AGRONOMY – (Descriptive - 80 marks)

Green Revolution; Major Farming Systems; Farming Systems approach - value addition - requirements in new technology; Seed – definition - characteristics of good quality seed - vegetative propagation in field crops; Integrated Nutrient Management; Role of water in soil and plants; Irrigated agriculture vs. Rainfed agriculture, dry farming and dryland farming; Water management of different crops; Weeds – introduction, harmful and beneficial effects, classification, propagation and dissemination; Origin, geographical distribution, economic importance, soil and climatic requirement, varieties, cultural practices, harvest and post harvest handling of two main crops – Rice and Maize; Rice-crop planning - Nursery raising (land preparation, seed treatment, sowing, water management, nutrient management, and plant protection) – Main field preparation (transplanting, water management, nutrient management and plant protection); Cropping Systems – Rice based cropping system; Crop cafeteria for multiple cropping; Organic farming and food security – Principles of organic farming – tools and practices of organic farming and Current status of organic farming.

'OR'

HORTICULTURE – (Descriptive - 80 marks)

Fundamentals of Horticulture : Orchard planning, techniques of training and pruning, Plant growth regulators – natural and synthetic regulators – preparation and methods of application, Plant propagation, potting and re-potting – objectives and uses, containers and potting media/mixture – kinds, qualities, pre-planting treatments; Principles of landscaping – designing and preparation of landscape and garden plans – application of the outdoor room concept; Specialized gardening techniques – rock gardening – water gardening – bonsai – roof gardens – terrace gardens, Indoor gardening; Introduction to Commercial floriculture – problems and prospects of commercial floriculture in India; Principles of flower arrangement – styles and designs – tools, containers and accessories, collection and preparation of flowers and foliage, judging of flowers, flower arrangements and flowering and foliage plants in shows and exhibition; Types of vegetable farming – kitchen garden, market garden, truck garden, vegetable garden for processing, vegetable garden for seed production; Glasshouse cultivation and other protected systems; Factors affecting vegetable production; Basic principles in vegetable production – nursery, sowing and transplanting, care and management ; Vegetable seed production – general principles, breeding system, isolation distance, rouging, cultural operations, seed standards, packing and storage; Classification of fruits; Definition, classification and importance of Spices and medicinal plants in the State; Postharvest management techniques for fruits and vegetables – storage of fruits and vegetables ambient low temperature and controlled temperature storage systems, packaging of fresh and processed products.

2. PLANT PHYSIOLOGY – (Objective - 20 marks)

Crop physiology – introduction and importance in Agriculture; Transpiration, significance transpiration in relation to crop productivity and water use efficiency; Photosynthesis - Energy synthesis, relationship of photosynthesis and crop productivity, methods of measuring photosynthesis, photosynthetic efficiency; Translocation of assimilates and

apoplastic and symplastic transport of assimilates; Respiration and its significance – measurement of respiration; Post harvest physiology – seed dormancy – definition – types of seed dormancy – advantages and disadvantages of seed dormancy – causes and remedial measures for breaking seed dormancy.

PAPER – II : (100 marks)

1. PLANT BREEDING & GENETICS (Descriptive - 80 marks)

Classification of plants – different systems of classification; Mendel's laws of inheritance and exceptions to the laws; Mutation and its features – methods of inducing mutations; Aims, objectives and importance of Plant Breeding; Methods of breeding – introduction and acclimatization, Selection, Mass selection, Johansson's pure line theory, genetic basis, pure line selection; Hybridization – aims and objectives – types of hybridization; Breeding objectives and concepts of breeding in self pollinated, cross pollinated and vegetatively propagated crops; Breeding procedures for development of hybrids, varieties of various crops; Intellectual Property Rights (IPR) – definition, concepts and components – plant breeders' rights and farmers' rights; Maintenance of genetic purity during seed production; Seed quality – definition, characters of good quality seed – different classes of seed; Production of nucleus & breeder's seed, Foundation and certified seed production; Seed testing procedures for quality assessment.

'OR'

SOIL SCIENCE & AGRICULTURAL CHEMISTRY (Descriptive - 80 marks)

Soil physical properties – soil texture – textural classes – particle size analysis, soil structure classification – soil aggregates – significance; Elementary knowledge of soil classification; Concept of pH – soil acidity – brief overview of saline, sodic and calcareous soils, soil organic matter – composition – decomposability – humus – fractionation of organic matter; Enzymes – factors affecting the activity, classification, immobilisation and other industrial applications; Quality parameters of organic manures and specifications, Recycling of organic residue – industrial effluents concept and assessment – soil health card; Integrated Nutrient Management (INM) and Integrated Plant Nutrient Supply system (IPNS); Fertilizers – classification – manufacturing processes and properties of major nitrogenous – phosphatic – potassic and complex fertilizers – their fate and reactions in soil; Soil as a source of plant nutrients – essential and beneficial elements – mechanisms of nutrient transport to plants – factors affecting nutrient availability to plants; Soil fertility – different approaches for soil fertility evaluation; Methods of soil testing – chemical methods – critical levels of different nutrients in soil; Environmental pollution – causes, effects and control of air, water, soil, thermal, noise and marine pollution.

2. AGRIL MICRO-BIOLOGY (Objective - 20 marks)

Introduction and to microbial world – history of microbiology; spontaneous generation theory – bacterial cell – morphology and structure – germ theory of disease – protection against infections – applied areas of microbiology – metabolism of bacteria; Soil microbiology – microbial groups in soil – microbial transformations of carbon, nitrogen, phosphorus and sulphur – biological nitrogen fixation – role of microbes in fermentation – beneficial microorganisms in agriculture – microbial insecticides – microbial agents for control of plant disease – biodegradable plastics – plant microbe interactions.

PAPER – III : (100 marks)

1. AGRIL. ENTOMOLOGY (Descriptive - 80 marks)

Classification of phylum Arthropoda, Relationship of class Insecta with other classes of Arthropoda; Classification – importance, history, development and binomial nomenclature; Methods of collection and preservation of insects; Insect ecology – introduction & importance; Pest surveillance and pest forecasting; Integrated Pests Management (IPM) – introduction, importance, concepts, principles, practices, scope, limitations and tools of IPM; Chemical control – importance, hazards & limitations and Classification of Insecticides; Study of important insecticides, botanical insecticides, synthetic insecticides, nematicides, rodenticides, acaricides and fumigants; Plant Protection equipments; Distribution, biology, nature & symptoms of damage and management strategies of insect pests of important crops viz., rice, maize, potato, tomato; Stored grain pests – introduction, causes of storage losses, preventive & curative methods of management; Nature & symptoms of damage in crops by plant parasitic nematodes and other non-insect pests; Rodents – general characters of important species, biology, habits and management.

'OR'

PLANT PATHOLOGY (Descriptive - 80 marks)

History – terms & concepts – important plant pathogenic organisms; survival & dispersal of plant pathogens; General characters of fungi – definition of fungus – classification of fungi - reproduction in fungi (asexual & sexual); Nomenclature, Binomial system of nomenclature and rules of nomenclature; Plant disease epidemiology; General principles of plant diseases management – cultural methods, physical methods, heat & chemical methods; Methods of application of fungicides; Host plant resistance – Defense mechanism in plants; Integrated plant disease management (IDM) – concept, advantages and importance; Economic importance, symptoms, cause, disease cycle and integrated management of diseases of important crops viz., rice, maize and solanaceous vegetables; Economic importance, symptoms, cause, disease cycle and integrated management of diseases of important horticultural crops viz., citrus, pineapple, arecanut, black pepper, ginger, tea, rose, orchids and anthurium.

2. AGRIL. METEOROLOGY (Objective - 20 marks)

Introduction to Meteorology & Agricultural Meteorology – scope and importance of Agril. Meteorology – Role of greenhouse gases in global cooling and warming – concept of weather and climate – factors affecting surface air temperature – soil temperature and its variation; Atmospheric humidity – Rainfall and its mechanisms – forms & types of rainfall; Indian monsoons – southwest monsoon, northeast monsoon, monsoon visibility across India; Importance of weather forecasting in Agriculture – weather service to farmers – agricultural seasons – crop weather relationships – role of weather on insect pests and diseases – weather and climate-related natural disasters, risk and management; Climate change and global warming; Introduction to Remote Sensing.

PAPER – IV : (100 marks)

1. AGRIL. EXTENSION (Descriptive - 80 marks)

Importance of Rural sociology in Agril. Extension and interrelationship between Rural Sociology & Agril. Extension; Social Organizations – meaning, definition, types of organizations and role of Social Organizations in Agril. Extension; Leadership – meaning, definition, roles of a leader, different methods of selection of professional and lay leaders; Training of leaders – meaning, definition methods of training, advantages and limitations in use of local leaders in Agril. Extension; Teaching – learning process – meaning and definition of teaching, learning, learning experience and learning situation, elements of learning situation and its characteristics, principles of adult learning and their implications for teaching; Extension Education and Agril. Extension – meaning, definition, concepts, objectives and principles; Rural development – meaning, definition, concepts, objectives, importance and problems in rural development; Communication skills – meaning & process of communication, verbal & non-verbal communication, writing skills, oral presentation skills, field diary and lab record; Extension teaching methods – meaning, definition, functions and classification; Individual contact methods – farm and home visit, result demonstration; Field trials – meaning, objectives, steps, merits and demerits; Training of farmers, farm women and rural youth – Farmers' Training Centres & Krishi Vigyan Kendras.

'OR'

AGRIL. ECONOMICS (Descriptive - 80 marks)

Agril. Economics – meaning, definition, basic concepts – goods, service, utility, value, price, wealth, welfare; Production – meaning, factors of production; National income – definition and concepts; Inflation – definition and types of inflation; Agril. Finance - nature and scope; Crop Insurance programme in India; Production economics – meaning, definition, nature and scope of agril. production economics; Economic principles applied to the organizations of farm business; Farm inventory- methods of valuation of farm assets – depreciation – meaning – methods of computation – types and systems of farming – farm planning and budgeting, farm budgeting; Agril. Marketing – concepts and definition – scope and subject matter, Market and marketing – meaning, definitions, elements of a market – classification of agril. marketing; Marketing channels – meaning, definition, Marketing efficiency – meaning, definition - marketing costs – margins and price spread factors affecting the cost of marketing; Measures to improve marketing efficiency – cooperative marketing – contract farming; Agril. Price Policy in India – objectives – role of CACP – administered prices; Agril. Business – meaning, definition, structure of agribusiness (input, farm, product sectors); Agro-based industries – importance & need – types of agro-based industries; Marketing management – meaning, definitions, marketing management functions – 5Ps of marketing.

2. PLANT BIOTECHNOLOGY (Objective - 20 marks)

Concepts of Plant Biotechnology, History of Plant tissue culture and Plant Genetic Engineering; Scope & importance in Crop Improvement; Genetic Engineering – gene cloning – direct & indirect method of gene transfer – transgenic plants and their applications; Biosafety rules & regulations – rules related to GM crops – research, development, field trials and commercial cultivation; Intellectual Property Rights (IPR) – concepts, trade related aspects of IPR; Intellectual property and International trade – WTO, WIPO, GATT, TRIPS; Protection of plant and animal genetic resources, biological materials, gene patenting, biotechnology related IPR issues.