

SYLLABUS FOR AGRICULTURE FIELD ASSISTANT

- Principles of agronomy – Agriculture: definition, its branches and scope. Classification of field crops-botanical, commercial, seasons, agronomic and objectives. Factor affecting crop production, Agricultural crop zone of North East and India. Tillage: definition of tillage and tith. Classification of tillage: Influence of tillage on physical properties of soil. Zero tillage and its application. Planting geometry and its effect on growth and yield. Cropping system: definition and types of cropping systems. Difference between dry land farming and rain fed farming. Watershed: definition and management aspects. Problems of dry land agriculture and improvement. Land Use System, Alternate land use system in the state context with examples.
- Weather and Agriculture, Agro climatic zones of the North East & India, Earth's atmosphere, Composition and structure. Climate change: causes, effect on ecosystem and on crop production, climate resilient practices, issues and strategies. Global warming and its impact on agriculture, greenh ouse effect, greenhouse gas emission from Agriculture sources, Agriculture Waste Management. Introduction to Indian Monsoon, Agriculture and environment, climatic factors effecting crop production. Meteorological service to Agriculture, Weather forecasting and its significance in Agriculture.
- Soil- definition and components of soil, Soil profile, physical properties of soil - Soil texture, soil structure, density of soil, porosity of soil, soil colour, soil temperature and the role of soil fertility. Soil air- definition and its importance, factors affecting the composition of soil air. Soil water- importance of soil water, physical and biological classification of soil. Soil ph and its effect on availability of nutrients and plant growth. Soil health management and soil heath card (SCH). Problematic soils, Salt affected soils: - Nature and classification, characteristics, detrimental effects of soil acidity, salinity and alkalinity and their reclamation. Soil amendments, Soils types of Nagaland. Soil organic matter. C: N ratio, Soil biota (organisms) and its role in Fertility, Role of soil organic matter in crop production.
- Economic importance of Plant Pathology. General morphological characteristics of Fungi, Bacteria, Virus, Mycoplasma and plant parasitic Nematodes. Feedings habits of nematodes. Classification of Plant diseases. Principles of plant disease management. Methods of plant disease management- cultural methods, legal methods, biological methods, chemical methods and use of resistant 'variety. Mushroom cultivation techniques- Oyster and button mushroom technologies. Preparation of some common fungicides- Bordeaux mixture and paste, tobacco concoction, Neem kernel suspension and Kerosene emulsion.
- Genetics: Definition. Plant cell- Structure and functions. Chromosomes and cell division i.e. Mitosis and Meiosis. Mendel's principles and Mendel's law of Inheritance. Gene interactions, quantitative inheritance, linkage and crossing overs. Sex determination and recombination
- Mutation and its importance in agriculture. Plant breeding: Definition, Principles or plant breeding. Modes of reproduction in field crops- self and Cross pollinated crops.

Methods of breeding in self and cross pollinated crops. Crop improvement, open pollinated variety, composite and synthetic variety, multilines, hybrids. Crops and cultivars in the context of climate change. Hybridization, Heterosis, Biotechnology and its importance in agriculture. IPR on plant varieties and different forms of IPR & FR (Farmers Rights) & Traditional knowledge, plant tissue culture and its application in agriculture.

- Principles of Horticulture: Introduction, definition, branches of horticulture and importance of fruits and vegetables in human diet. Scope, current situation and importance of horticulture in India. Propagation methods of horticultural crops, definition, types, classification, merits and demerits. Principles of pruning and training, need, objectives and scope. GAP (Good Agricultural Practices) in major horticultural crops, Choice of trees and plants for various afro-climatic zones. Protected cultivation and its use. Off-Season crops and economic importance. Mushroom Cultivation techniques-oyster and button mushroom cultivation. PHM (Post Harvest Management) techniques of some commercial fruits and vegetable crops.
- Fundamentals of Entomology, Apiculture and Insect Control: Introduction, important character of phylum Arthropoda and its classification up to class insect. Dominance of insects in animal kingdom, Economic importance of insect in agriculture. General organization of an insect body, Moulting, Metamorphosis. Classification of insect. Various systems of insect. Bee keeping types of species, rearing techniques and their management. Control measure-mechanical, chemical, biological. IPM approaches, Predators and parasites. Indigenous insect pest control practices and preparations. Rodents, its life cycle and control measures. Bamboo flowering and its relation to rodent pest.
- Agricultural Statistics: Statistics-its meaning, definition and importance in agriculture. Frequency distribution. Measures of Central tendency-Arithmetic mean. Measures of dispersion Standard deviation, Standard error of mean, *co*-efficient of variation. Test of significance- Student 't' test and 'F' test. Experimental design-Basic principles of experimental design. Concept of ANOVA, CRD and RBD
- Field Crops (Kharif)
- Name of crop, Common name, Scientific name and family. Origin, economic importance, Classification of crops -botanical, commercial, seasonal, agronomic and objectives. Soil and climatic requirements, cultural practices viz., selection of seeds, seed treatment, sowing method seed rate, Fertilizer recommendations, time and method of application of manures, fertilizers and bio-fertilizers. Thinning, gap filling, earthing up, inter-culturing, weed control measures, irrigation, crop rotation, intermixed/relay cropping. Major insect-pests and diseases, Bio-control measure, harvesting, threshing, winnowing, cleaning, drying, storage and yield. Recommended high yielding, improved and hybrid varieties.
- Cereals Major crops: Rice-upland jhum paddy, Irrigated paddy (I RC/WI:RC, SRI), Maize,
- Sorghum, Pearl millet (Bairn) and Minor crops: Finger millet, Foxtail millet, Pearl millet and

- Job's tears. Pulses: Soya bean, Pigeon pea Mung/Green gram, Black gram, Bengal gram/Chick pea,
- French Bean Rajmash, urad bean, Cluster bean, Rice bean and Cowpea. Oilseeds: Groundnut, Sunflower and Sesame. Fibre crops: cotton, Jute and Ramie Root/Tuber crops: Potato, Colocasia, Sweet potato, Tapioca, Yam, Ginger. Commercial crop: Coffee, Tea, Rubber, Agar, Jatropha, Tung and broom (*Thysalolaena Ma: Vilna*) Forage and grasses crops: Jowar, Maize, Napier grass etc
- Manures and fertilizers: Introduction-Manures-types of manures-Bulky and concentrated-FYM, Composts-Different composting methods. Mechanical compost plants. Vermi-composting, Green manures: types and its application mode, oil cakes, sewage and sludge-Biogas plant slurry, plant and animal refuges, Types and roles of organic manures. Fertilizers- classification with nutrient content. Manufacturing processes and properties of major nitrogenous (ammonium sulphate, urea, calcium ammonium nitrate, ammonium nitrate, ammonium sulphate nitrate), Phosphatic (single super phosphate, enriched super phosphate, di-ammonium phosphate, ammonium poly phosphate), Potassic and complex fertilizers, their fate in the soil, Secondary and micronutrients fertilizers, Amendments. Methods of fertilizer application. Fertilizer storage. Fertilizer control order. Bio-fertilizers and advantages. Type of bio-fertilizers and their potential. Merits and constraints of bio-fertilizer use. Precautions for the use of bio-fertilizers.
- Post-Harvest Technology: Introduction to post harvest technology. Post-harvest technology and operations process for cereal, pulse and oil seed crops. PHM of fruits and vegetables, potato, spices and plantation crops. Post-harvest study of sugarcane. Postharvest losses, operations and value addition. Study of cold storage methods and ware house for major crops.
- Crop Physiology Theory: Definition. Photosynthesis: Significance-site of photo synthesis-light and dark reaction. Photorespiration-factors affecting photosynthesis-respiration- glycolysis-Krebs cycle anaerobic respiration-respiratory quotient-compensation point. Water relations: Importance of water, active and passive absorption, ascent of sap. Transpiration: Definition, significance, anti-transpirants. Factors affecting to transpiration. Plant growth and development. Plant hormones-auxins-gibberellins-cytokinins-ethylene and abscisic acid and their modification. Photoperiodism and verbalization.
- Production technology of Fruit crops: Importance and scope of fruit crops. Orchardplanning – layout and management practices. Selection of site, fencing, and wind break for fruit crops. Planting system, high density planting, and establishment. Principles of canopy management .Propagation methods and use of root stocks. Method of training, pruning and grafting and objectives. Package of practices of fruit crop; viz., Mango, banana, pineapple. Jackfruit, kiwi, citrus fruits- limes, lemons and orange; Stone fruits - peach, pear, apple, papaya, Guava, Pomegranate, Passion fruit, Persimmon and strawberry.

- Principles of Livestock and Poultry Production: Origin, domestication and utility of farm animals and their role in Indian economy, Animal husbandry methods in India, common terms pertaining to different species of livestock, Utility classification of breeds of cattle. Familiarization with different breeds of cattle (indigenous and exotic) and buffaloes. Classification of breeds of sheep and goat. Introduction to common feeds and, fodders, their classification and utility, Introduction to poultry industry in. Common terms pertaining to poultry production and management. Concept of mixed farming and its relevance to socio-economic conditions of farmers in India. Technologies for sustainable livestock development. Best management practices for sustainable livestock production. Piggery farming and management, Common diseases and symptoms in poultry, sheep, goat, pig, Cattle -care and management. An introduction to Turkey, quail and Rabbit farming, Livestock vaccination schedule. Milk production technology and value addition. Fodder Production and pasteurization technologies.
- Introduction to: Sericulture status in India and North east. Economic aspect of Silk industry. Types/varieties of silk and its habitat, Type of host-plant species. Cultivation aspects or host plants. Mulberry silk rearing and cultivation, disease and pest management. Silkworm improvement and rearing practices, Preparation of Silkworm eggs, Major Silkworm diseases, control and management practices. Oak Tasar Culture. Eri (Castor) culture, Muga culture, Rearing technique for Mulberry silkworm, post production and management aspects. Cocoon marketing, Eri Silk reeling and spinning. Value addition and marketing.
- Water Management: definition, Water and its importance to crop production. Physical and Biological classification of water Soil Moisture and forms of soil moisture. Irrigation definition and objectives. Types and classification of Irrigation system (only names). Advantages and disadvantages of irrigation. Water resources and Irrigation development. Critical stages of crops for irrigation. Approaches for scheduling irrigation: Systems and Methods of irrigation in detail surface methods (only definition and examples), flooding, check basin method, Basin method, Borderstrip method, Furrow irrigation, Sprinkler and drip irrigation (definition, advantages and disadvantages only).Quality of irrigation water, Salinity hazards, Sodium hazards. Salinity and Sodium management process. Water and its management in different crops (rice, wheat, maize, groundnut, sugarcane, banana and tomato). Drainage and types of drainage (names only). Construction of water harvesting structures in various soil conditions.
- Principles of Agricultural Economics : Definition of Economics, Scope and importance of economics, Difference between Micro and Macro Economics. Basic terms and concepts used in economics. Economic principles applied to financial management of farm, law of diminishing returns, principle of marginalism, principle of combining enterprises or product-product, principle of comparative advantage. Production and supply: Nature and factors of production, Short-run and long run production function,

Theory of cost, Short-run and Long-run cost curves. Characteristics of perfect and various imperfect market and their equilibrium conditions.

- Demand and supply of money, Inflation, monetary and fiscal policy, Importance and function of public finance, public revenue, expenditure and taxation (in brief), Cash management and entrepreneurial skills (concepts only)
- Field Crops (Rabi) II Name of crop, Common name, botanical name and family. Origin, economic importance, soil and climatic requirements, cultural practices viz., selection of seeds, seed treatment, sowing, method, seed rate, Fertilizer recommendation, time and method of application of manures. Fertilizers and bioFertilizers, thinning, gap tilling, earthing up, interculturing, weed control measures including (INM) integrated weed management, irrigation. Crop rotation, intermixed/relay cropping major insect-pests and diseases, Bio-control measures, harvesting, post-harvest managements, value addition, recommended high yielding, improved and hybrid varieties, yield.
- Cereals and major crop: Wheat, Pulses : French bean, lentil, Field Pea, Oilseeds : Mustard, Toria Rapeseed, Sunflower and linseed. Sugar crops Major crop: Sugarcane and Sugar beet.
- Commercial crops : Potatos, TPS, Rabi Forage crops: Lucerne or Alfafa, Cowpea or Lobia .
- Perennial grass fodder:Hybrid Napier, Guinea Grass.
- Plant Nutrition: Definition of plant nutrients. Criteria of essentiality of an element, Classification of plant nutrients. Available forms of the nutrients in soil. Macro nutrients: Nitrogen, Phosphorus, Potassium. Secondary nutrients: Calcium, Magnesium, Sulphur. Micro-nutrients: Iron, Copper, Zinc, Magnesium, Boron and Molybdenum. Sources of nutrients- functions/role and deficiency symptoms (in brief). Integrated Nutrient Management (INM), Concept, components and constraints in adoption. Production Technology of Vegetable Crops: Definition of vegetable and importance or vegetable crops. Types of vegetable garden. Layout of Kitchen garden and objectives. Package of practices for vegetable crops viz, tomato, brinjal, Chilli,Capsicum ,King chilli ,ladies finger, Chow chow(Squash), Cucurbits viz., cucumber, bottle gourd, bitter gourd, small gourd, pointed gourd, pumpkin, watermelon. Cole crops viz., cabbage, cauliflower, broccoli, chinese cabbage. Bulbs viz., onion, leek and garlic. Tuber Crops viz., potato and sweet potato; root craps viz, carrot, radish and beet root. Leafy vegetable viz., lettuce, spinach, Kale, Methi Pulse vegetable.viz, pea. cowpea, Rice bean, French bean and cluster bean, Spices: Ginger, Turmeric, Black pepper, cardamom(large) . Cultivation techniques of off season crops.
- Diseases of Fruit and Vegetable Crops and their Management. Symptoms, favourable weather conditions and management of :
 1. Potato: Early blight, Late blight, Common scab
 2. Tomato: Early and late blight, Leaf curl, Root knot
 3. Brinj al: Damping off, wilt, fruit rot, little leaf, Altiernaria leaf spot.
 4. Chilli & King Chilli: Leafcurl, Anthracnose, Fruit rot.
 5. Okra: Powdery mildew, Yellow vein mosaic virus
 6. Onion: Purple blotch

7. Cruciferous: Blag leg, Altenaria leaf spot, damping off, powdery mildew, club root
8. Cucurbits: Powdery mildew, Downy mildew
9. Mango: Anthracnose, powdery mildew, Malformation
10. Citrus: Canker, Gummosis, citrus die back
11. Banana: Panama, Cigatoka, Bunchy top
12. Papaya: Foot rot, leaf curl
13. Ginger & Turmeric: Stem rot, leaf spot
14. Pineapple: Fruit rot
15. Passion fruit: Canker
16. Carrot: Split root, Root scat.
17. Litchi: Fruit cracking
18. Stone fruits: Flower & fruit drop

- Farming Systems and Farm Management: Cropping systems and cropping scheme. Farming systems: definition, principles and components. Classification of farming system. Models of Integrated Farming Systems. Hill Agriculture and characterization. Production systems of hilly Agriculture and constraints, Farming systems of NE Regions. Jhum system of farming/Shifting cultivation- Jhum intensification methods. Soil conservation practices in Jhum farming system. Fallow Management in hill agriculture. Technologies for enhancing sustainability of production systems.
- Farm Management- Definition and objective of farm management. Types and systems of farm and farm structure, advantage and disadvantages. Study of farm records and registers. Farm planning and budget. Characteristics of a good farm. Managing farm problems. Agriculture labour- definition, Classifications (names only) and problems.

Pests of Fruits and Vegetable crops and their management: Details of marks or identification, host, nature of damage, life history and management of important pests of horticultural crops-viz., Vegetables (okra, brinjal, tomato, potato, cabbage, cauliflower, broccoli, chilli. king chilli, cucurbits, cruciferous & onion). Fruit crop- (mango, banana,, citrus, guava, pomegranate, stone fruits, citrus spp, papaya, kiwi, strawberry, pineapple and passion fruit.)

- Farm Power and Agriculture Machinery: Importance of Agriculture machineries, traditional vs. improved farm machinery. Land development and tillage machinery. Equipments for seed bed preparation-Primary (Mould board plough, Disc plough) and secondary tillage (Cultivator and harrows) implements, Field operation of line sowing equipment (Seed drill, transplanter), SRI method of planting with marker, power tiller and matching implements, Plant protection equipments -Operation, use and maintenance of sprayers and dusters, Operation and maintenance of harvesting tools (improved sickle, power reaper), Harvesting and threshing machines. Farm equipment for dry land farming-tillage, seeding, fertilizer application, interculture and weeding equipment, harvesting equipment. Improved farm equipment for farmwomen. Energy in Agriculture, use and sources-renewable energy and conservation technologies.
- FISHERY & MANAGEMENT: Importance of fisheries in India, Common terms pertaining to fish production, Study of some important local and exotic fish species and

their feeding habits. Culture and seed production of fresh water fin fishes and shell fishes. Technologies on Composite fish culture, fish seed production and management. Integrated fish farming, Integrated farming system-paddy cum fish culture, Diseases of fish, their control and management. Pond culture and management. Study of different sources of fisheries, its advantages and disadvantages. Feed manual and types of feeds. Processing, post-harvest technologies, by-products and value addition in fishes.

- Fundamentals of Extension Education and Communication and New Extension Reforms: Extension Education: Definition, importance, objectives and principles of Extension Education. Teaching-learning process, learning situations. Extension Teaching methods and its classification. Projected and non projected audio visual aid. Method and result demonstration, field trip. Motivation and personality development, Team building, managing farmers interest groups. Communication-Meaning, definition and importance. Elements of communication process and adoption process, on-communication techniques. Extension Management, Introduction to New Extension Reforms concept and objectives, ATMA, FO's (Farmers organizations), Sociometry and its use in managing SHG's definition and function, criteria for selection of SHG's, PRA techniques and its salient features, PPP (Public-private partnership), ICT in agriculture, Handling of Internet-mails and video conferencing. NeGP-A, Kisan call centre, Agribusiness and Agri clinic.
- Weed Management: definition and characterization of weeds, harmful effects and usefulness of weeds. Classification of weeds and propagation of weeds, Crop-weed competition and allelopathy, Principles of weed management. Preventive methods of weed control, Physical, cultural and biological methods for weed control, Herbicidal (chemical) control of weeds. Benefits and limitation of herbicide. Methods of application of soil and foliage active herbicide treatments. Type of herbicide treatments on the basis of time of application. Formulation of herbicides. Precautionary measures in application of herbicide. Weed control in major field and horticultural crops. Parasitic and problematic weeds and their control. IWM (Integrated Weed Management) in major crops.
- Organic Farming and Sustainable Agriculture: Organic farming, definition, Principles and concept of organic farming. Objectives of organic farming. Basic steps of organic farming. Components of organic farming and their role in sustainable crop production. Organic farming in relation to soil health and quality production. Nutrient management in organic farming. Disease and pest management in organic farming. Promotion, certification, inspection and accreditation process of organic product. Organic farming scenario in India. National Standards of Organic farming. Vermiculture technology. Sustainable Agriculture: Introduction, definition, goal and concepts. Differences between Modern Agriculture and Sustainable Agriculture. Land degradation and conservation of natural resources. Technologies for conservation of natural resources in arable and non-arable land. Biodiversity and its role in food security.
- Seed Production Technology: Importance of seed production, goals and role of seed industry in India. Principles of seed production. Types of seed, seed structure and

morphology. Classes of seed Characteristics of good quality seed. The Seeds Act and salient features of the seeds act. Types of seed sold in the market, (Labelled/TF, Hybrid and certified seeds). Maintenance of varieties and seed multiplication. Minimum isolation distance for seed production of some major field crops. Minimum seed standards for TL/Certified seeds prescribed as per the Indian Seeds Act. Seed production stages in TL/Certified seeds. Seed testing, seed processing, drying and storage for seed certification. Seed dormancy, Factors and method of breaking seed dormancy. Introduction to seed pelleting.

- Production Technology of Ornamentals, Medicinal and Aromatics : Ornamentals annuals, biennials and perennials, shrubs and trees (definition and examples only) - scope and economic value. Commercial flowers-its scope, value addition and market aspects in North East . Production technologies of some commercially viable flowers viz. Anthurium, Chrysanthemum, Orchids, Carnation, Rose, liliun, Heliconia and cut flowers Introduction to green house technology and maintenance. Scope and importance of Medicinal and aromatic plants, study of general principles of climate and soil for cultivation of medicinal and aromatic plants, production technology of some suitable MAP of NE and Nagaland and uses viz., Sugandhmantri, lemon grass, citronella, patchouli, aswagandha, rose geranium, Stevia and Alovera etc
- Pests of Field Crops and their Management : Details of marks of identification, host, nature of damage, life history and management of important pests of field crops Cereals- rice, maize, pearl millet/bajra, sorghum and wheat, Pulses-(pigeon pea, Soyabean, chickpea, green gram, French bean, Rice bean), Oilseeds- (groundnut, mustard, sunflower, linseed and sesamum), Cash crops potato, sweet potato, cotton, Tea, Coffee, Ginger, Turmeric, King Chilli, Rubber, Jute and Sugarcane.
- Diseases of Field Crops and their Management: Symptoms, favourable weather conditions and management of millets: Downy mildew, Ergot, Smuts, Anthracnose. Wheat: Rusts, Loose smut. Rice: Blast, Bacterial blight, Brown leaf spot False smut, sheath blight, Maize: brown stripe, leaf spot, bacterial rot stalk, downy mildew, brown leaf rust. Groundnut: Tikka disease, Rust, collar rot, stem rot. Cotton: Angular leaf spot, Wilt. Sesamum: Phyllody, Phytophthora blight, Pulses: Anthracnose, powdery mildews, downy mildews, bacterial leaf spot, Wilt, Sterility mosaic, Stunt virus; wilt and root rot. Mustard: Damping off, white rust, powdery mildew, downy mildew. Potato; late blight, bacterial blight, soft rot, leaf blight. Ginger: rhizome rot, yellow disease, bacterial wilt. Tea: red rust, brown blight, abnormal leaf fall. Coffee: Leaf rust, die back Rubber: stem or shoot rot, powdery mildew, patch or bark canker.
- Agricultural Finance, Agricultural Marketing and Agricultural Crop Insurance :
- Agriculture Finance- Concept and scope, Importance of Agricultural Finance, Problems agricultural credit in India, Requisites of good credit system, Five C's of credit, Seven P's of credit. Classification of credit and loan, Institutional agencies in agricultural credit, test of farm credit proposal, tools of farm financial analysis, agricultural projects definition and concept and types(name only).Benefit-cost ratio.
- Agriculture Crop Insurance- Definition and objectives of crop insurance, Approaches in crop insurance, Types of insurance, Crop insurance products, New crop insurance

products, NAIS (National Agricultural Crop Insurance Scheme), WBCIS (Weather Based Crop Insurance Scheme), RKBY (Rashtriya Krishi Bima Yojana)-objectives of the scheme and crops covered, farmers covered, risk covered. Sum insured and premium rates, subsidy. How to buy insurance and benefits expected.

- Agriculture Trade & Marketing- Definitions, importance of agricultural trade ,export and imports composition of agricultural products(names only),Marketing management in Agri business .Rural marketing, Risk management, Future trading /emerging trade scenario(concept only). Role and scope of agricultural marketing, classification of markets, producer's surplus, p, problems in agricultural marketing, marketing channels, agricultural prices. Role of government in agricultural marketing, Marketing efficiency marketing margin, price spread (definition only), cooperative marketing, FCI (food corporation of India), quality control of agricultural products, contract farming-concept study of few successful cases.
- Legal instruments: APMA (Agriculture Market Produce Regulation Act), APMC, ECA (Essential Commodities Act), Prevention of Food Adulteration Act, Consumer Protection
- Act, AGMARK (Agriculture Product and Marketing Act)
- Fundamentals of Soil Water Conservation and Engineering: Surveying-survey equipment, chain survey, cross staff survey, plotting procedure, calculation of area of regular and irregular fields. Levelling- levelling equipment, terminology, methods of calculation of reduced levels, types of levelling, contouring. Soil and water conservation- soil erosion types and engineering control measures.



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