GENERAL AGRICULTURE

1. PREAMBLE

This syllabus has been structured to assess learners' knowledge and skills in the management of the soil, raising crops and animals; processing, storage and marketing of agricultural produce and for keeping records and accounts.

It will help to effectively assess the scientific, vocational and technological competencies of candidates to fit into the various sub-sectors of agriculture and for tertiary education.

2. AIMS AND OBJECTIVES

The syllabus is designed to assess candidates'

(1) knowledge and understanding of agricultural principles and practices;
(2) skills in laboratory and field work involving carrying out agricultural experiments, projects and farm work;
(3) scientific skills including observation, classification and interpretation of agricultural data;
(4) skills in setting up and managing agribusinesses;
(5) ability to apply scientific knowledge and skills in solving agricultural problems;
(6) understanding of the value chain concept for maintaining food quality and safety standards.

3. SCHEME OF EXAMINATION

There will be three papers, Papers 1, 2 and 3 all of which must be taken. Papers 1 and 2 will be a composite paper to be taken at one sitting.

PAPER 1: Will consist of fifty multiple-choice objective questions all of which must be answered within 1 hour for 50 marks.

PAPER 2: Will consist of ten essay questions divided into five sections, Sections A, B, C, D and E covering the following areas of the syllabus:

Section A: Introduction to Agriculture and Farm Mechanization
Section B: Soil Uses and Management
Section C: Crop production
Section D: Animal Production
Section E: Agricultural Economics, Agribusiness and Extension.

Each section will consist of two questions. Candidates will be required to answer one question only from each section for 16 marks. The paper will last 2 hours.

PAPER 3: Will be a practical test for school candidates or alternative to practical work test for private candidates. Each version will consist of four questions all of which must be answered within 2 hours for 60 marks.

DETAILED SYLLABUS

CONTENTS	NOTES
INTRODUCTION TO AGRICULTURE	
1. Importance of agriculture to the national economy	
• Definition and branches of agriculture	
(b) Role of agriculture in the national economy	
• Meaning, types and importance of agricultural education in national development	
(a) Meaning and types of agricultural education	
• Importance of agricultural education	The branches should include crop production, animal production, horticulture, farm mechanization, soil management, fisheries, forestry, agricultural economics and extension.
(c) Agricultural occupations	The roles of agriculture in the economic development of the nation. E.g. food, shelter, raw material as well as the inter-dependence of agriculture and industry will be assessed.
(d) Job description and entry requirements for	Types should include formal e.g. general, pre-vocational and vocational; non-formal e.g. agricultural extension and agricultural youth clubs; informal e.g. apprenticeship. Merits and demerits of the formal type should be assessed. Importance should include manpower development,

requirements for agricultural occupations	acquisition of leadership skills, inculcating the spirit of voluntarism in the youth, strengthening democracy and enhancing rural development. Assessment should cover the major divisions of occupations in agriculture e.g. production of crops and animals, agricultural mechanization, processing of agricultural produce, landscaping, agricultural resource management, forestry, teaching and research and provision of services.
3. Measurements in agriculture (a) Calculations in agriculture	
(b) Comparison between indigenous measurement and standardized units of measurement.	
4. Land and its uses (a) Uses of land: Agricultural and non-agricultural uses	Calculation of area, volume, percentage, plant density, yield per unit area, rate of application of fertilizers and pesticides, seed rate and dressing percentage of carcasses are required.
(b) Land tenure systems in West Africa	Advantages and disadvantages of using indigenous and standardized units of measurement are required.
(c) Effects of land tenure systems on agricultural production	
5. Introduction to forestry	Uses of land for agriculture, forestry, game and wildlife, fisheries should be assessed.
(a) Definition of forest and forestry	Description of the systems should include communal land ownership, free-hold title, lease-hold title, tenancy.
(b) Salient features of forest	Effects should include the merits and demerits of each system.
6. Forest products and their contribution to national development	Differences between forestry and forests are required.
(a) Types of plants and animals in the forest	Knowledge of the salient features should include the following: long term activity; occupies large area for a long period of time; develop over several years; poses lots of risks; provides business opportunities.

(b) Contributions of forests to national development	Types of plants: trees, shrubs, herbs, climbers, fungi etc. Types of animals: birds, insects, mammals, reptiles, amphibians, snails etc. Knowledge and understanding of contributions of the forest to national development: conservation of climate, water, soil, plant and animal species; sustenance of agricultural production; provision of wood for industry, construction and fuel. Uses of timber and non-timber forest products: - Timber products for buildings, furniture, railway, paper, boats and canoes, carving, utensils, toys, educational equipment, etc - Non-timber forest products such as game and wildlife, skins and hides, plant medicine, foods and spices, ropes, roofing materials, sponge, etc.
(c) Meaning, causes and effects of deforestation	Contribution of forest and forest products to employment, income generation (both local and foreign) social and educational activities and health.
(d) Forest management practices	Knowledge and understanding of effects of deforestation on the environment and the national economy are required.
(e) Game and wildlife conservation	Management skills should include: selective exploitation of forest resources and forest regeneration.
7. Sustainable agriculture and good agricultural practices (GAP)	Importance of game and wildlife and its socio-economic contributions.
(a) The concepts of sustainable agriculture and good agricultural practices	Concept of sustainable agriculture should include practices that address problems of soil fertility, pest control and environmental degradation and ensures continued agricultural productivity. Good agricultural practices that ensure the attainment of acceptable food safety and quality standards are required. Examples of sustainable agricultural practices and good agricultural practices in West Africa are required.

	Knowledge of the relationships between the two concepts should be assessed.
(b) Factors influencing Good agricultural practices and sustainable agricultural production in West Africa.	Factors should include social, technological, economic and political. Physical factors such as climate change as well as food quality and safety standards should also be assessed.
8. Development of agriculture (a) Meaning and objectives of agricultural development	Objectives of agricultural development in West Africa should include: self sufficiency in food production, improved traditional cash crop production for export, production of non-traditional crops and animals for export, practice of sustainable agriculture and production of industrial raw materials.
(b) Problems of agricultural development in West Africa	Problems should include: land tenure systems, inadequate social amenities, low level of education, presence of devastating diseases, low access to extension services, ageing farming population, poor transportation systems and limited knowledge of improved technologies. Solutions to problems should also be assessed.
(c) Role of government and other agencies in agricultural development	Roles played by agencies such as ministry responsible for agriculture, research institutions, banks, processing companies, universities, NGO's should be covered.
B. SOIL USES AND MANAGEMENT 1.Origin and formation of soils	Assessment should be limited to only the main types of rocks – igneous, sedimentary and metamorphic.
(a) Classification and formation of rocks	Understanding of the process of weathering of rocks (physical, chemical and biological), transportation and deposition of weathered materials, role of organic matter are required.
(b) Processes of soil formation	The roles played by each factor should be assessed.
(c) Factors of soil formation: parent material	Soil horizons should be described in terms of colour, texture, structure, depth, porosity and organic matter

parent material, topography, living organisms, climate and time	content. Importance of the knowledge of soil profile in crop production should also be assessed.
(d) Soil profile Meaning, description and the importance of soil profile	
	Assessment should be based on organic matter (including micro-living organisms), mineral particles, air and water. The roles of soil living organisms and organic matter should be assessed.
● Nature, composition and properties of soil (a) Components of soil	Physical properties should include colour, texture, structure, soil air, water, temperature, consistency. Chemical properties e.g. soil reaction (pH). The importance of soil physical and chemical properties to the growth and development of crop plants should also be covered.
● Properties of soil: Physical and chemical properties	The methods should include slashing, hoeing, felling, controlled burning, stumping, ridging and mounding. Bulldozing, felling, ploughing, harrowing, use of herbicides and ridging should be assessed.
● Land preparation practices	
(a) Methods of land preparation: (i) Indigenous methods	Plant nutrients should be classified into macro-nutrients and micro-nutrients.
(ii) Mechanized methods	Functions of nitrogen, phosphorus, potassium, zinc and iron in plant growth and development are required. Knowledge of deficiency symptoms associated with nitrogen, phosphorus, potassium, zinc and iron are required.
(b) Effects of indigenous and mechanized methods of land preparation on the soil	The cycles as natural sources of nitrogen and carbon should be covered.
4. Plant nutrients and	The knowledge and understanding of nitrogen and carbon cycles are required.

nutrient cycles (a) Classification and sources of plant nutrients	
(b) Functions of plant nutrients	Explanation of the concepts of soil fertility and productivity is required.
(c) Deficiency symptoms of nutrients in plants	Assessment should include adequate nutrients, presence of organic matter, suitable pH, good water holding capacity, good aeration and absence of toxic substances.
(d) Nitrogen and carbon cycles	Methods such as crop rotation, application of fertilizers, cover cropping, liming, mulching and fallowing are required.
5. Soil fertility and its maintenance (a) Meaning of soil fertility and soil productivity	Fertilizers should be classified into organic and inorganic (chemical) fertilizers. Further classification of inorganic fertilizers into compound, straight or single fertilizers is also required. Knowledge and skills in the preparation of compost using stack/heap and pit methods are required.
(b) Characteristics of fertile soil	Knowledge and skills in the application of fertilizer should include broadcasting, row placement or side dressing, band placement and foliar application. Split application of fertilizers involving top dressing should be assessed.
(c) Methods of maintaining and improving soil fertility	Understanding of factors such as crop factors, soil factors, climatic factors, social factors and management is required.
(d) Classification of fertilizers	
(e) Preparation of compost	
(f) Methods of fertilizer application	

(g) Factors affecting fertilizer use	
6. Soil and water conservation (a) Concepts of soil and water conservation (b) Types of soil water and their importance (c) Soil erosion: agents and types (d) Factors influencing soil erosion (e) Effects of soil erosion (f) Economic importance of soil erosion (g) Soil and water conservation methods C. FARM MECHANIZATION • Introduction to farm	

mechanization (a) Meaning, objectives and importance of farm mechanization (b) Safety precautions on the farm	
	Explanation of the concepts of soil and water conservation is required.
2. Farm power Sources of farm power: human, animal, combustion engines, solar, wind, water and electricity	Knowledge and understanding of gravitational water (non-available water), capillary water, hygroscopic water, available water and superfluous water are required. Wilting point and field capacity should be covered.
	Agents such as water, wind, ice should be covered. Types of erosion caused by water and wind should also be assessed.
● Farm machinery and implements: tractor, power tiller, mistblower, lawn mower, knapsack sprayer, plough, harrow, ridger, planter and trailer	Factors should include wind, rainfall, topography, vegetation cover, soil type, human and animal activities.
	Effects such as loss of top soil, loss of soil fertility, siltation of dams, reduction in water holding capacity of soils should covered.
4. Harvest and post-harvest tools, equipment and machinery (a) Harvesting tool: e.g. sickle, cutlass and hoe	The methods should be assessed under agronomic, soil conditioning and tillage practices.
(b) Harvesting machinery: e.g. combine harvester, cotton picker and groundnut lifter	Knowledge and understanding of the meaning, objectives and importance of farm mechanization are required.
(c) Processing machinery and equipment: cassava grater, corn miller and dehusker.	Farm safety measures in the use of machinery, electricity, agro-chemicals, draught animals, sharp tools should be covered. Dressing codes, first aid and use of first aid box should also be covered.
(d) Storage equipment	

(d) Storage equipment: e.g. silos, barns, cribs, refrigerator and deep freezers.	Assessment of sources of farm power should include the use of draught animals and factors that affect the efficiency of draught animals.
5. Irrigation and Drainage (a) Meaning, merits and demerits of irrigation and drainage	Uses, merits and demerits of each source of farm power should also be covered.
	Differences between farm machinery and implements should be covered.
• Classification and methods of irrigation and drainage systems including their merits and demerits	Assessment should include use, care and maintenance of farm machinery and implements. Candidates should be able to identify the major parts of farm implements and state their functions. The major parts of the internal combustion engine and their functions should also be covered.
	Skills in the operation of simple farm machines should be assessed.
6. Surveying and planning of farmstead (a) Purpose of surveying And measurement	Assessment should include identification, functions, care and maintenance of tools, equipment and machinery. The names and functions of the principal parts of each machine should also be covered.
	Knowledge and ability to operate harvesting, processing and storage equipment should be covered.
(b) Surveying instruments and their uses	
(c) Procedure for conducting a survey	
	Differences between irrigation and drainage are required. Benefits and problems of irrigation and drainage in agriculture should also be covered.
(d) Map preparation	
	Knowledge and understanding of irrigation systems such as surface (e.g. furrow, flooding and drip/trickle); overhead (e.g. sprinkler, use of watering can); and drainage systems (open or surface, subsurface). Merits and demerits of each system should be covered.
(e) Meaning and importance of farmstead planning	
(f) Principles of planning	Assessment should cover equipment used in irrigation and

farmstead outlay	drainage e.g. watering cans, pipes, sprinklers and pumps.
D. CROP PRODUCTION	Importance of surveying in road construction, agriculture, mining and town planning should be covered.
1. Importance and classification of crop plants (a) Benefits derived from crop plants	Assessment should cover identification, uses, care and maintenance of the following instruments: ranging poles, gunters chain, measuring tape, prismatic compass, theodolite, dumpy level, abney level, tripod stand, global placement system (GPS) and total station (TS).
(b) Classification of crop plants	Knowledge and understanding of procedures for conducting reconnaissance and preliminary surveys, as well as linear and angular measurements and recording of data are required.
2. Principles of crop production (a) Site selection and preparation	Scale selection, baseline determination and transfer of field measurements onto maps should be covered. Knowledge and understanding of farmstead outlay should cover the influence of factors such as topography, water source, type of soil, direction of wind and sunshine.
(b) Meaning and objectives of tillage	
(c) Methods of plant propagation	Knowledge of the benefits of crop plants such as food, animal feed, industrial raw materials, employment, income and foreign exchange is required.
(d) Activities in seed propagation	Classification based on growth cycle/lifespan, botany, uses and methods of cultivation should be covered.
(e) Methods of vegetative propagation	Factors influencing the selection of a site e.g. topography, water, soil type, vegetation, market; different methods of land preparation (indigenous and mechanized) and their effects on the soil should be covered.
(f) Cultural practices in	Meaning of tillage; tillage practices (ploughing, harrowing,

crop production	ridging, mounding); types of tillage (minimum, zero, primary and secondary); objectives of tillage are required. Differences between primary and secondary tillage should also be covered.
3. General principles and practices of plant protection	Knowledge and understanding of plant propagation by seeds and vegetative parts as well as their merits and demerits should be covered.
(a) Classification of crop diseases	Seed propagation activities such as seed selection, testing, treatment and planting methods; planting at stake and nursery practices are required.
(b) Diseases of crop plants:	Propagation involving the use of materials such as corms, suckers, rhizomes, slips, crowns, runners, bulbs, tubers and manipulation of plants as in budding, grafting and layering should be covered.
	Assessment should cover the description and reasons for carrying out cultural practices in crop production.
(i) <u>Fungal diseases</u> Damping off, leaf spot of maize, gummosis of citrus, sikatoga of plantain/ banana, black pod of cocoa	
(ii) <u>Bacterial diseases</u> Bacterial soft rot of carrots, cabbage rot, black soft rot of onion	Diseases to be classified into pathogenic diseases (bacterial, viral, fungal, and nematodes diseases); and non-pathogenic diseases (caused by excess or low nutrient levels, temperature, water etc.)
(iii) <u>Viral diseases</u> Cassava leaf mosaic, leaf curl, groundnut leaf rosette, maize streak, Cape St. Paul wilt, swollen shoot	Assessment of the understanding of the diseases should be done under the following headings: - causal agent; - mode of transmission; - affected crop(s); - symptoms; - prevention and control measures.
(iv) <u>Nematodes and worms</u> Rook knot nematode disease of tomato and okro	
(v) <u>Non-pathogenic diseases</u> Blossom-end rot of tomato	
(c) Effects of plant diseases on	

crop production. (d) Classification of crop pests (e) Methods of pest and disease control (f) Weeds (g) Invasive Alien species (IAS)	Assessment should cover knowledge and understanding of the effects of diseases on crop production. Classification of crop pests should include rodents, insects, birds and nematodes. Classification of pests into field and storage pests as well as the classification of insect Control methods should include physical, chemical, biological, cultural, prohibition/quarantine, integrated pest management and use of resistant varieties.
4. Husbandry of selected crops: Climatic and soil requirements, land preparation, seed rate, spacing, time of planting, nursery requirements, fertilizer application, weed control, pest and diseases control, harvesting and storage of at least **one** crop from each of the following crop groupings: (a) <u>Field crops</u> Maize, sorghum, cassava, yam, cowpea, groundnut (b) <u>Vegetable crops</u> Tomato, okro, onion, shallot (c) <u>Fruit crops</u> Plantain, banana,	Assessment should cover classification, importance, mode of dispersal and methods of weed control. Ability to calibrate knapsack sprayer for purposes of chemical control of weeds is required. Definition, identification and description of common features of invasive alien species. Effects of invasive alien species on agriculture. Ways to prevent and control invasive alien species are required. Assessment should be based on the knowledge and ability to measure yield of harvested crops in terms of weight, crates and bags per unit area of land. Knowledge and skills in post-harvest handling of produce to minimize losses as well as cost-benefit analysis of projects should be covered.

pineapple, mango, citrus (d) <u>Tree crops</u> Cocoa, oil palm, cashew	
5. Principles of crop improvement (a) Meaning and aims of crop improvement (b) Methods of crop improvement: introduction, selection and cross-breeding	
6. Basic principles of ornamental plant production (a) Identification, classification and importance of ornamental plants (b) Preparation of beds and borders	Aims such as production of disease/pest resistant varieties, to increase yield, to improve quality of produce, to reduce maturity period should be covered. Knowledge and understanding of the methods are required.
E. ANIMAL PRODUCTION 1. Importance, classification and distribution of breeds of farm animals in West Africa (a) Importance of farm animals	Assessment should be based on identification, importance and classification of various types of ornamental plants according to their uses e.g. bedding plants, hedging plants, borders, trees, shrubs, climbing plants and lawns plants. Differences between bed and borders; and principles to be observed when planting beds and borders should also be covered.

(b) Classification of farm Animals	
(c) Characteristics and distribution of farm animals in West Africa	Importance of farm animals should include food, traction, power, transport, research, supply of manure, feed, medicine, sports and pleasure. Animals should be classified as: Ruminants: e.g. sheep, goat, cattle Non-ruminants: e.g. pigs, poultry Non-ruminant herbivores: e.g. rabbits, horses, grasscutters
2. Animal nutrition (a) Digestive system of farm animals	Identification of the major breeds of farm animals, their characteristics and distribution in West Africa as well as factors affecting the distribution of farm animals should be covered. Knowledge and understanding of the digestive system and the process of digestion in ruminant and non-ruminant farm animals are required.
(b) Importance of food nutrients in animal production: carbohydrates, proteins, fats, minerals, vitamins and water	
(c) Classification of feedstuffs	Classification should be based on the major nutrient groups. Importance of roughage in feedstuff should be covered.
(d) Animal feed preparation	Knowledge and skills in the preparation of the following forms of animal feed: concentrates, silage, hay, fresh herbage are required.
(e) Types of animal ration: balanced, maintenance and production rations	Appropriate rations for animals at each stage of growth should be covered. E.g. starter, maintenance, grower rations. Ration formulation should be assessed.
(f) Malnutrition in farm animals	Effects of malnutrition on animal production are also required.
(g) Meaning, types and importance of forage and pasture crops	Identification of some common forage and pasture crops and their importance should be covered.
3. Reproduction in farm animals	
(a) Male and female reproductive systems	
(b) Oestrus and signs of heat	

(c) Process of reproduction	The names and functions of the major parts of the male and female reproductive systems of farm animals should be assessed.
(d) Inbreeding: causes and effects	Knowledge and understanding of oestrus, signs of heat and its importance are required.
4. Principles of animal improvement (a) Meaning and aims of animal improvement	Assessment should cover mating, fertilization, gestation and parturition as well as functions of hormones involved in reproduction.
(b) Methods of animal improvement	Ways of preventing inbreeding should be covered.
(c) Artificial insemination	Assessment should cover methods such as introduction, selection and breeding. Advantages and disadvantages of each method are also required.
5. General management practices in farm animal production (a) Meaning and objectives of Management practices in animal production	Procedures such as semen collection, dilution, storage and insemination are required. Advantages and disadvantages of artificial insemination should be covered.
(b) Management systems of keeping farm animal	Assessment should be based on knowledge and understanding of suitable environmental factors in animal housing e.g. ventilation, space and weather conditions; appropriate feedstuffs and feed preparation; creep feeding, weaning, debeaking, dehorning, disbudding, castration, fostering of young animals and record keeping.
(c) Selection of breeding stock	Explanation of extensive, semi-intensive and intensive systems is required. Advantages and disadvantages of each system should be assessed.
(d) Processing and marketing of farm animals	Assessment should be based on factors considered in

	selecting breeding stock e.g. performance records, appearance and state of animal.
6. Principles of animal health management (a) Diseases in farm animal and their causes (b) Diseases of farm animal: • Viral: Foot and mouth, rinderpest, Newcastle, fowl pox (ii) Bacterial: Anthrax, brucellosis, tuberculosis (iii) Fungal: aspergillosis, ringworm (iv) Protozoan: trypanosomiasis, coccidiosis, redwater	Knowledge and skills in slaughtering and dressing of farm animals should be covered. Marketing whole animals or in cut-up parts of the carcass is required. Causes of diseases should include bacteria, viruses, fungi, protozoa. The role of injuries, poisons, hereditary conditions and nutritional deficiencies should be covered. Assessment of the knowledge and understanding of the diseases should be under the following headings: causal organisms; mode of transmission; animals affected; symptoms; effects on animals; prevention and control measures. The role of vectors in disease transmission should also be covered
(c) Pests and parasites of farm animals (i) Classification of parasites of farm animals (ii) Effects of pests and parasites on their host (iii) Economic importance of pests and parasites (d) Prevention and control of pests and parasites of farm animals	Classification of parasites into ecto-parasites and endo-parasites is required. Assessment would include structure of tapeworm, liver fluke, roundworm, louse and mite. Effects of these parasites on their host should be assessed. Methods including sanitary practices, isolation, prohibition, quarantine, routine vaccination, good nutrition, use of drugs and recommended chemicals should be covered.
7. Husbandry of selected farm animals: selection of breeding stock; housing; feeding; breeding programme; routine	Assessment of the husbandry practices of at least **one** animal from each of the following groups is required: Ruminants: cattle, sheep and goats Non-ruminants: poultry and pigs Non-ruminant herbivores: grasscutters, guinea pigs and rabbits

management practices; pests and diseases, their prevention and control	
8. Introduction to fisheries Meaning and types of fisheries	Description of the various types of fisheries: - Culture fisheries (aquaculture/fish farming) - Capture fisheries (subsistence, commercial, artisanal, industrial fisheries) Comparison of subsistence and commercial fisheries as well as comparison of artisanal and industrial fisheries are all required.
9. Fish farming (a) Meaning of aquaculture and fish farming	Knowledge of the differences between aquaculture and fish farming is required.
(b) Benefits and problems associated with fish farming	Assessment should cover benefits and problems of fish farming. Possible solutions to problems associated with fish farming should also be covered.
(c) Facilities for growing fish	Knowledge of the uses of earthen ponds, cages, concrete tanks, raceways and fish pens in growing fish is required.
(d) Factors that influence choice of site for a fish pond	Factors to be considered including soil type, slope of land and availability of water; and management practices such as pond stocking, feeding of fish, water quality maintenance, pond maintenance and production control are required.
(e) Harvesting, processing and preservation of fish	Signs of maturity and methods used in harvesting fish are required. Methods of processing fish including washing, scaling, gutting and filleting as well as methods of preserving fish should such as smoking, cooking, salting, drying, frying, freezing and canning should be covered.
F. AGRICULTURAL ECONOMICS, AGRIBUSINESS AND EXTENSION	
1. Agricultural economics: Importance and basic principles	Knowledge of the scope of agricultural economics: basic economic principles, factors of production, keeping records and accounts, agricultural financing and marketing of agricultural produce are required.

(a) Meaning and scope of agricultural economics	Economic properties of the farm: input – output property, market orientation, income, employment generation properties etc. should be covered.
(b) The farm as an economic unit	Assessment should cover knowledge of the application of economic principles in the management of agribusiness and policy formulation.
	Factors influencing demand and supply should be assessed.
(c) Agricultural economics and farm management in agribusiness	Effects of shifts in the demand and supply curves on equilibrium price are required.
(d) Principles of demand and supply	Assessment should cover the characteristics of land and factors that determine the supply of land; the sources of agricultural labour and factors that determine the supply and efficiency of labour; the types of agricultural capital and the role of capital.
(e) Determination of price for a commodity	
2. Factors of production	Determination of how the various factors could be combined for maximization of profits and the law of diminishing marginal returns should be covered.
(a) Land, labour, capital, management	The drawing and interpretation of the production function curve; total product curve; average product curve and the marginal product curve are required.
(b) Functions of farm manager	
(c) The production function: The law of diminishing returns	Examples of agribusiness such as crop and animal production, fisheries, agroforestry, agroprocessing and specialized services in agriculture should be covered.
	On-farm businesses such as tractor operation, cattle range management and bee-keeping as well as off-farm businesses such as agricultural extension, quarantine and pineapple export are required.
3. Introduction to agribusiness management	Planning, organizing, budgeting, record keeping, supervising, coordinating should be covered.
(a) Meaning and examples of agribusiness	
(b) Agribusinesses and agriculture-related occupations/	Assessment will include availability of capital, tools/equipment, material/input and market.

professions	
(c) Skills/tasks/ activities performed in agribusiness management	Types of credit e.g. short, medium and long term credits should be assessed. Knowledge of subsidies as a form of agricultural financing is required.
● Establishment and management of agribusiness	
(a) Factors to consider in setting up an agribusiness	Conditions such as collateral security, surety, personal reputation and personal investment should be covered.
(b) Steps in establishing agribusiness	Knowledge and skill of preparing a business plan are required.
5. Agricultural financing	Merits and demerit of the credit sources are also required.
(a) Sources of farm credit: Banks, co-operative societies, money lenders, governmental agencies, marketing boards, thrift and loan societies	Differences between farm records and accounts will be assessed.
(b) Conditions for obtaining credit	Types of farm records including physical records (maps, weather chart), inventory records, financial records, production and labour records should be covered. The types of farm accounts should cover asset and liability accounts, receipts and expenditure accounts, capital and credit accounts. Skills in preparing income and expenditure account, profit and loss account and balance sheet is required.
6. Farm records and accounts	
(a) Types and importance of farm records and accounts	Difference(s) between marketing and markets will be assessed. Knowledge of the importance of marketing is required. Assembling, processing, grading, sorting, storage, transportation, advertising and distribution etc should be covered. The role of marketing agents such as producers, middlemen, consumers, country buyers, wholesalers, retailers and brokers are required.

	Functions of marketing agencies such as marketing boards and co-operatives are also required.
(b) Preparation of financial statements	Merits and demerits of various agents and agencies should be covered.
7. Marketing of Agricultural produce	
(a) Meaning and importance	
(b) Marketing functions	
(c) Marketing channels, agents and agencies	
	The roles of agencies such as the universities, research institutions, ministry responsible for agriculture, non-governmental organizations in extension education should be covered
(d) Problems associated with marketing of agricultural produce	Characteristics such as the establishment of a strong administrative support, provision of adequate financial support, good transportation, staff motivation and effective monitoring and evaluation should be covered.
8. Agricultural extension	
(a) Meaning and importance of agricultural extension	Advantages and disadvantages of each extension teaching method are required.
(i) Objectives and importance	
(ii) Role of agencies in extension education	
(iii) Characteristics of an effective extension system	How value chain influences the competitiveness and success of selected industries should be covered.
(iv) Problems and issues in	

extension education	
(b) Extension teaching methods: Individual, group and mass methods	Knowledge and understanding of the importance of standards in food quality and safety assurance in domestic, regional and international markets are required.
9. The value chain approach in food quality and safety assurance	Key players in food quality and safety assurance (private and public sectors) should be covered e.g. EPA, Food and Drugs Authority and GSA.
(a) Definition and characteristics of value chain	Food safety practices by private, national and international or global standards along the value chain are required. Local and international bodies responsible for food quality and safety assurance e.g. GSA, EPA, ISO should be covered.
(b) Benefits of value chain development in agricultural production and marketing	
(c) Principles of value chain approach	Identification and uses of forest products and by-products such as sawn timber, plywood, medicinal plants, snails, animal skins and ivory should be assessed.
(d) Food quality and food safety	Identification and uses of indigenous measuring devices are required.
(e) Bodies responsible for food quality and safety assurance	Identification of the common rock types: igneous, sedimentary and metamorphic should be covered.
(f) Practices for ensuring food quality and safety along the value chain	Identification and simple description of soil profile are required.
A. INTRODUCTION TO AGRICULTURE	Assessment will be based on skills to perform experiments to determine physical properties of soil.
1. Identification and uses of forest products and their by-products	
2. Measurement in Agriculture	

B. SOIL USES AND MANAGEMENT 1. Rocks	
2. Soil Profile	
3. Laboratory work on physical properties of the soil:	
(a) Examination of texture by manual feel (wet or dry and by sedimentation, porosity and capillary experiments	Assessment will be based on the skills to perform experiments to determine chemical properties of soil.
(b) Mechanical analysis by the use of sieves	Identification of fertilizers, methods of application and calculations of rates of application are required. Both heap and pit methods are required.
(c) Determination of moisture content of a moist soil sample by weight	
(d) Determination of porosity and water holding capacity	Identification, description, uses and maintenance of various farm tools and equipment including the following: hoe, cutlass, garden trowel, hand fork, shovel, spade, rake, sickle, secateurs, shears, long- handled hoe, pruning knife and budding knife shoul be covered.
(e) Demonstration of capillary action	
4. Laboratory work on chemical properties of soil: Demonstration of soil acidity using simpletests e.g. litmus paper and colour chart	Identification, description and uses of tractor and animal-drawn implements such as ploughs, harrows, ridgers, planters and cultivators as well as identification of the major parts of the implements and their functions, care and maintenance are required.
5. Laboratory work to demonstrate the presence of living organisms in the soil	Identification and functions of the major components of the tractor; its operation, servicing and maintenance are required.
6. Ferilizers (organic and inorganic)	Identification, operation, care and maintenance of simple farm machines, e.g. mistblower, knapsack sprayer, mower and power tiller are required. Skill to calibrate the knapsack sprayer will also be assessed.

7. Simple demonstration of compost and farm yard manure preparation	Identification and use of harvesting and post- harvest tools and equipment e.g. sickle, cutlass, groundnut lifter, hoe and mattock are required.
C. FARM MECHANIZATION	Identification, operation, care and maintenance of harvesting and processing machinery such as combine harvester, cassava grater, corn miller, corn sheller and groundnut decorticator should be covered.
1. Farm tools and equipment	
	Identification, operation, care and maintenance of simple irrigation and drainage equipment such as watering can, sprinkler head and tiles will be assessed.
2. Tractor-drawn and animal-drawn implements	Identification, uses and care of simple surveying instruments eg. measuring tape, ranging poles, compass, gunters chain, pegs, theodolite, dumpy level and abney level are required.
3. Farm tractor	Classification based on growth cycle/life span, botany and uses should be covered.
4. Simple farm machines	Identification of seeds, seedlings, fruits, storage organs and essential parts of the common crop plants, pasture grasses, legumes and local weeds is required.
	Identification of main pests and their damage to crops e.g. cotton stainer, weevils of grains and groundnuts, beetles are required.
5. Harvesting and post-harvest tools, equipment and machinery.	Recognition of main diseases of crops and the causal agents, where feasible with characteristic symptoms e.g. smut of cereals, maize streak, swollen shoot of cocoa, mosaic of cassava, rosette of groundnut, leaf spot of groundnut, blast of rice, brown rot of pineapple, black pod of cocoa, root knot disease, blossom-end-rot of tomato, damping off disease and sigatoka of plantain/banana should all be covered.
6. Irrigation and drainage	Activities involved in propagation by seed: seed selection and testing, seed treatment, seed sowing, nursery practices are required.
7. Elementary surveying instrument	Skill to identify vegetative structures e.g. corms, rhizomes,

instrument	suckers, slips and runners should be assessed.
D. CROP PRODUCTION	Knowledge and skills in vegetative propagation through cutting, grafting, budding and layering are required.
1. Classification of crop plants	Knowledge and skills in the preparation of seed beds, fertilizer application, mulching, pesticides application, watering, pruning, staking and thinning are required. Calculation involving plant density/population is required.
2. Seeds, seedlings, fruits and storage organs of crops	Identification and classification of ornamental plants should be covered.
3. Main diseases and pests of crops in the field and in storage.	Identification of common weeds and preparation of weed album; knowledge of external features; mode of dispersal; various methods of weed control on the farm are required.
	Skill to measure crop yield is required.
	Identification of breeds and types of farm animals is required.
4. Plant propagation	Identification and function of the major parts of the digestive and reproductive systems are required.
(a) Propagation by seed: time of planting, seed rates,	Identification and uses of animal products and by-products e.g. hides, skins, furs, feathers and horns should be covered.
plant population and seed viability tests of common local crop plants	Identification and the uses of animal feed and animal feedstuffs, types of feedstuffs and feed ingredients e.g. fish meal, cakes, rice bran, blood meal, bone meal, wheat bran, oyster shell and salt are required.
(b) Vegetative propagation	Identification of main ectoparasites e.g. ticks, lice, and endoparasites e.g. tape worms and round worms as well as damages caused to their hosts and their control are required.
5. Seed bed preparation and cultural practices	Methods of prevention and control of diseases of farm animals e.g. use of drugs, drenching, dipping, spraying, simple methods of farm sanitation will also be assessed.
	Selection of breeding stock, management systems, care of animals, selection of eggs for hatching, egg collection and grading, milking of animals, skin branding, debeaking, dehorning and castration should be covered.

6. Ornamental plant production 7. Common weeds 8. Measurement of crop yields E. ANIMAL PRODUCTION 1. Common breeds of animals and the types of animals in West Africa 2. Major internal organs of farm Animals 3. Animal products and by-products 4. Animal feeds and their sources 5. Main pests and parasites of farm animals 6. Prevention and control of diseases of farm animals 7. General management practices in farm animals production	Equipment used in common management practices in farm animal production e.g. burdizzo, elastrator, drenching gun, dehorner and debeaker should be assessed. Processes involved in the slaughtering and dressing are required. Identification of common species of fish should be covered. Skills in stocking and managing fish ponds should be assessed. Skills in processing and preservation of fish are required. Identification of equipment fo r harvesting and preservation of fish is required. Preparation of the profit and loss account and the balance sheet from a given data is required. Skills in the drawing and interpretation of production function curves are also required.

8. Slaughtering of animals and dressing of the carcasses. 9. Stocking and management practices in fish farming. 10. Fish harvesting and preservation F. AGRICULTURAL ECONOMICS AND EXTENSION Simple calculations on demand and supply, equilibrium price determination, production function, income and expenditure account, balance sheet.	