

NATIONAL BOARD FOR TECHNICAL EDUCATION



NATIONAL DIPLOMA (ND)

IN

IRRIGATION AGRONOMY TECHNOLOGY

CURRICULUM AND COURSE SPECIFICATIONS

2020

NATIONAL DIPLOMA IN IRRIGATION AGRONOMY TECHNOLOGY

2.0 GOAL AND OBJECTIVES:

GOAL: The National Diploma in Irrigation Agronomy Technology is designed to produce Technicians conversant with environmentally sustainable production of field and horticultural crops under irrigated conditions.

OBJECTIVES: A product of ND in Irrigation Agronomy Technology should be able to:

1. Carry out feasibility studies in irrigation project establishment.
2. Know the general irrigation methods.
3. Know the sources of water and its management for irrigation.
4. Assist in design, supervise and construction of basic irrigation structures.
5. Know the drainage aspects of irrigation.
6. Manage soil related problems.
7. Know the factors affecting choice of irrigation methods.
8. Manage irrigation water quality.
9. Handle basic irrigation instruments and their maintenance.
10. Carry out the basic crop production technologies under irrigation.
11. Know the effects of climate change on irrigation.
12. Know the effects of global health challenges in irrigation agronomy practices.
13. Carry out Agricultural Extension services.
14. Establish irrigated crop production as a business.

Entry Requirements

The general entry requirements for the ND Irrigation Agronomy Technology Programme are:

(a) Five credits level passes in WAEC or NECO and NABTEB in not more than two sittings.

The subjects must include Biology/Agricultural Science, Chemistry, English, Mathematics and any of the following: Geography, Economics, Technical Drawing and Physics.

Structure of Programme

The National Diploma Irrigation Agronomy Technology is a two-year Programme i.e. four semesters of classroom, laboratory, field and workshop activities in the college. Four months Supervised Industrial Work Experience Scheme (SIWES) shall be carried out at the end of each year of the Programme. Each semester shall be of 17 weeks duration made up as follows: 15 Contact weeks of teaching, i.e. recitation, practical exercises, quiz, tests, etc and 2 weeks for examination and registration.

Evaluation Scheme

The National Diploma Irrigation Agronomy Technology Examination must be externally moderated. In grading the students, theory shall constitute 40% while Practical is 60%.

Accreditation

Each Programme offered at the National Diploma level shall be accredited by the NBTE before the Diplomates can be awarded the diploma certificates. Details about the process of accrediting a Programme for the award of the ND are available from the Executive Secretary, National Board for Technical Education, Plot B, Bida Road, P.M.B. 2239, Kaduna, Nigeria.

Conditions for the Award of ND Irrigation Agronomy Technology

Institutions offering accredited Programmes will award the National Diploma to candidates who successfully completed the Programme after passing prescribed course work, examinations, diploma project and the supervised industrial work experience. Such candidates should have completed a minimum of between 72 and 80 semester credit units depending on the Programme.

Diplomas shall be classified as follows:

Distinction - GPA of 3.50 and above

Upper Credit - GPA of 3.00 - 3.49

Lower Credit - GPA of 2.50 - 2.99

Pass - GPA of 2.00 - 2.49

Fail - GPA of below - 2.00

Guidance Notes for Teachers Teaching the Programme

The new curriculum is drawn in unit courses. This is in keeping with the provisions of the National Policy on Education which stresses the need to introduce the semester credit units which will enable a student who so wish to transfer the units already completed in an institution of similar standard from which he is transferring.

In designing the units, the principle of the modular system by product has been adopted; thus, making each of the professional modules, when completed provides the student with technician operative skills, which can be used for employment purpose.

As the success of the credit unit system depends on the articulation of Programme between the institutions and industry, the curriculum content has been written in behavioral objectives, so that it is clear to all the expected performances of the student who successfully completed some of the courses or the diplomats of the Programme. There is a slight departure in the presentation of the performance-based curriculum which requires the conditions under which the performance is expected to be carried out and the criteria for the acceptable levels of performance. It is a deliberate attempt to further involve the staff of the department teaching the Programme to write their own curriculum stating the conditions existing in the institution under which the performance can take place and to follow that with the criteria for deferring an acceptable level of performance. Departmental submission on the final curriculum may be vetted by the Academic Board of the institution.

Our aim is to continue to see to it that a solid internal evaluation system exists in each institution for ensuring minimum standard and quality of education in the programmes offered throughout the Technical and Vocational Education (TVE) system.

The teaching of the theory and practical work should as much as possible be integrated. Practical exercises, especially those in professional courses and laboratory work should not be taught in isolation from the theory. For most courses, there should be a balance of theory to practice in the ratio of 50:50 or 40:60 or the reverse.

TABLES

1ST YEAR 1ST SEMESTER

CODE	COURSE	L	T	P	CU	CH	TOTAL HRS/SEMSE TER
IAT 111	Introduction to Irrigation Agronomy	2	-	2	2	2	30
AGT 230	Agricultural Extension & Rural Sociology	3	-	-	3	3	45
IAT 112	Basic Irrigation Surveying	1	-	2	3	3	45
IAT 113	Introduction to Irrigation Practice	1	-	2	3	3	45
AGT 111	Principles of Crop Production	2	-	2	4	4	60
AGT 112	Elements of Agricultural Economics	2	-	-	2	2	30
AGT 113	Introduction to Soil Science	2	-	2	4	4	60
AGT115	Introduction to Agricultural Marketing	2	-	-	2	2	30
COM 001	Computer Applications I	-	-	3	3	3	45
GNS 111	Citizenship Education I	2	-	-	2	2	30
GNS 102	Communication in English I	2	-	-	2	2	30
	TOTAL						

1ST YEAR 2ND SEMESTER

CODE	COURSE	L	T	P	CU	CH	TOTAL HRS/SEMSETER
IAT 121	Irrigation Agronomy I	2	-	2	4	4	60
IAT 122	Soil Water Plant Relations	1	-	2	3	3	45
IAT 123	Irrigation of Horticultural Crops	1	-	2	3	3	45
ABE 125	Tractor Operations & Maintenance	1	-	3	4	4	60
IAT 125	Irrigation Practices I	2	-	1	3	3	45
AGT 121	Annual Crops	2	-	1	3	3	45
AGT 122	Crop Protection	2	-	1	3	3	45
AGT 127	Principles of Irrigation & Drainage	2	-	1	3	3	45
AGT 129	Industrial Crop Production I	2	-	2	4	4	60
GNS 202	Communication in English II	2	-	-	2	2	30
COM 002	Computer Applications II	3	-	-	3	3	45
GNS 121	Citizenship Education II	2	-	-	2	2	30
	TOTAL						

2ND YEAR 1ST SEMESTER

CODE	COURSE	L	T	P	CU	CH	TOTAL HRS/SEMSETER
IAT 211	Irrigation Agronomy II	2		2	4	4	60
IAT 212	Drainage Technology	2		2	4	4	60
IAT 213	Irrigation Practices II	1		2	3	3	45
AGT 212	Agro-Climatology	1		2	3	3	45
AGT 215	Soil Fertility & Crop Nutrition	2		2	4	4	60
AGT 216	Farm Soil Management	2		3	5	5	75
ABE 213	Irrigation & Drainage	2		2	4	4	60
EED 216	Introduction to Entrepreneurship	1		2	3	3	45
	TOTAL						

2ND YEAR 2ND SEMESTER

CODE	COURSE	L	T	P	CU	CH	TOTAL HRS/SEMSETER
IAT 222	Drainage Technology	1		2	3	3	45
IAT 223	Soil & Water Conservation for Irrigation	1		2	3	3	45
IAT 225	Irrigation Practice III	2		2	4	4	60
AGT 223	Farm Power & Mechanization	1		2	3	3	45
AGT 226	Horticultural Crop Production	2		2	4	4	60
IAT	Seminar						
IAT	Project						
	TOTAL						

PROGRAMME: IRRIGATION AGRONOMY TECHNOLOGY (NATIONAL DIPLOMA)							
COURSE: INTRODUCTION TO IRRIGATION AGRONOMY			CODE:IAT 111		Credit Unit:4	CONTACT HOURS:60	
GOAL: The course is designed to enable the students to understand irrigation agronomy as well as their basic principles							
GENERAL OBJECTIVES: On completion of the course the student should be able to : 1.0 Know the meaning of Agronomy and irrigation 2.0 Know the methods of Irrigation 3.0 Know the purpose and benefits of irrigation 4.0 Know how to measure irrigation water. 5.0 Know the sources of Irrigation water management 6.0 Know the methods of fertilizer application under irrigation 7.0 Know the cropping intensity under irrigation							
GENEREL OBJECTIVE 1.0: Know the meaning of Agronomy and irrigation							
THEORETICAL CONTENT				PRACTICAL CONTENT			
Specific Learning Outcome		Teachers’ Activities	Learning Resources	Specific Learning Outcome	Teachers’ Activities	Learning Resources	Evaluation
1.1 Define Agronomy and		Explain the meaning of	Magic boards, smart board, projector,				Test, quiz examination

Irrigation	Agronomy and Irrigation	slides				
1.2 List the importance of Agronomy and Irrigation	Enumerate the importance of agronomy and irrigation	Magic boards, smart board, projector, slides				Test, quiz, examination
1.3 Describe the concept of Irrigation Agronomy	Discuss the Concept of Irrigation Agronomy	Magic boards, smart board, projector, slides				Test, quiz, examination
GENERAL OBJECTIVE 2.0: Know the methods of Irrigation						
THEORETICAL CONTENT			PRACTICAL CONTENT			
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
2.1 Identify the different methods of irrigation e.g. surface, sprinkler and drip	Outline the different methods of irrigation as in 2.1	Magic board, white marker board, textbooks, slides	Identify different methods of irrigation as in 2.1	Guide the students to identify various irrigation methods as in 2.1	Suitable site,Pvc pipes, plastic hose, watering can, practical log books, source of water, etc	Test, Assignment,practicals Examination

2.2 Explain the advantages and disadvantages of the different irrigation methods.	List the advantages and disadvantages of the different irrigation methods.	Magic board, white marker board, textbooks, slides				Test, Assignment, Examination
2.3 List the factors that affect choice of irrigation method e.g. climate, soil, topography, crop type etc.	Enumerate the factors that affect the choice of irrigation as 2.3	Magic board, white marker board, textbooks, slides				Test, Assignment, Examination

GENERAL OBJECTIVE 3.0: Know the purpose and benefits of irrigation

THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
3.1 Explain the purposes of irrigation	Elucidate the purposes of irrigation	Textbooks, white marker board, projector				Test, examination
3.2 Explain the	Discuss the					

advantages of adopting irrigation practice	advantages of adopting irrigation practice e.g. (a) All year round production (b) drought escape (c) Production intensification (d) income (e) food security	Textbooks, white board, marker projector				Test ,examination
3.3 Explain the disadvantages of irrigation practice	Elaborate the disadvantages of irrigation practice e.g. (a)soil health (b)excessive leaching (c) erosion (d) water logging problems	Textbooks, white board, marker projector				Test ,examination
GENERAL OBJECTIVE 4.0: Know how to measure irrigation water						
THEORETICAL CONTENT			PRACTICAL CONTENT			
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation

4.1 Explain the Purpose of irrigation water measurement	Discuss the purpose of irrigation measurement	Textbooks, white board, marker projector				Test ,examination
4.2 Explain measurement of irrigation water quantity.	Discuss irrigation water measurement techniques.	Textbooks, white marker board, projector Textbooks, white marker board, projector	Demonstrate how to measure irrigation water	Guide the students on how to measure irrigation water	Measuring cylinders, measuring tape, graduated containers, water source, parshall flumes, weirs, etc.	Test ,examination Test ,examination

GENERAL OBJECTIVE 5.0: Know the Sources of Irrigation water.

THEORETICAL CONTENT

PRACTICAL CONTENT

Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
5.1 Identify the various sources of water for irrigation; (a) Surface (b) underground (c) recharging water reservoir	Expound the various sources of water for irrigation	Textbooks, white board, marker, projector				Test quiz ,assignment Examination
5.2 Discuss advantages and disadvantages of the	Explain the advantages of the various sources of	Textbooks, white marker board, mark, projector				Test quiz ,assignment Examination

various sources of water for irrigation.	water for irrigation.					
5.3 Describe the relationship between the water source and choice of irrigation method.	Explain the relationship between the water source and choice of irrigation method.	Textbooks, white marker board, mark, projector				Test quiz ,assignment examination
6.0 GENERAL OBJECTIVE : Know the methods of fertilizer application under irrigation						
THEORETICAL CONTENT			PRACTICAL CONTENT			
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation

6.1 Enumerate the different types of fertilizers	Describe organic and inorganic fertilizers	Textbooks, board projector	white marker,	Identify the different types of fertilizer.	Guide the students to identify different types of fertilizer	Poultry droppings, cow dung, goat droppings, urea, SSP, NPK,etc.	Practical log books, test and quiz
6.2 List the different forms of fertilizer.	Describe liquid, granular, pelleted fertilizer forms.	Textbooks, board projector	white marker,	Identify the different forms of fertilizer	Guide the students to identify different forms of fertilizer	Fertilizer samples	Practical log books, test and quiz
6.3 Identify methods of fertilizer application under irrigation	Explain the different methods of fertilizer application under irrigationeg foliar application, fertigation ,etc	Textbooks, board projector	white marker,	Identify the different methods of fertilizer application under irrigation as in 6.3	Guide the students to identify different methods of fertilizer application under irrigation.	Boom sprayer, knapsack sprayer, broadcaster, Field trips to different irrigation fields, etc	Practical log books, test and quiz
6.4 Discuss the problems associated with fertilizer application under irrigation.	Explain the problems associated with fertilizer application under irrigation (salinity, clogging of pipes etc)	Textbooks, board projector	white marker,	Identify the problems associated with fertilizer application under irrigation.	Guide the students to identify problems associated with fertilizer application under irrigation.	Suitable sites, etc	Practical log books, test and quiz

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GENERAL OBJECTIVE 7.0: Know cropping intensity under irrigation

THEORETICAL CONTENT

PRACTICAL CONTENT

Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
7.1 Explain the concept of cropping intensity.	Discuss the concept of cropping intensity.	Textbooks, white board marker, projector	Identify cropping intensity under irrigation	Guide the students to identify cropping intensity under irrigation	Suitable sites, etc	Practical log books
7.2 Explain the relationship between increased cropping intensity and increased food	Elucidate the relationship between increased cropping intensity and increased	Textbooks, white board marker, projector				Practical log books

production, food and security and employment	food production, food security and employment						
7.3 Explain how irrigation increases cropping intensity	Discuss how irrigation increases cropping intensity	Textbooks, white board marker, projector					

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY

COURSE: AGT 230 - AGRICULTURAL EXTENSION AND RURAL SOCIOLOGY

DURATION: 45 HOURS (3 HOURS LECTURES)

UNITS: 2.0

GOAL: This course is designed to acquaint students with the methods of selling modern methods of farming to adult and young farmers.

GENERAL OBJECTIVES: On completion of this course, the student will be able to:-

1.0 Know the scope and need for extension work in agriculture.

- 2.0 Understand the principle of agricultural extensions.
- 3.0 Understand the role of communication in extension.
- 4.0 Understand the concept of innovation and adoption in extension.
- 5.0` Understand the importance of audio-visual aids in extension teaching.
- 6.0 Understand the methods of creating teaching situations for adult learners.
- 7.0 Understand the roles of local leaders in agricultural extension.
- 8.0 Understand the principles of extension administration.
- 9.0 Know the role of Agricultural Research Institutes in extension work.
- 10.0 Understand basic sociological concepts and elements making up the social systems.
- 11.0 Understand the organization and functioning of Nigerian rural institutions.
- 12.0 Understand the agents of social change and barriers to social change in Nigeria.

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: AGRICULTURAL EXTENSION	COURSE CODE: AGT 230	CONTACT HOURS: 30 HRS
GOAL: This course is designed to acquaint students with the methods of selling modern methods of farming to adult and young farmers.		
COURS	Practical Contents:	

SPECIFICATION:						
	General Objective: 1.0 Outline the scope and need for extension work in agriculture.					
Week	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	1.1 Know the definition of agricultural extension. 1.2 Know the history of agricultural extension in the world. 1.3 Understand the objectives of extension. 1.4 Know the various components of agricultural extension viz: method, extension, communication, extension administration and operation, extension programme planning and execution. 1.5 Understand the reason for the wide difference between available scientific knowledge in	Explain what agricultural extension means. Outline the history of agricultural extension in the world. Explain the objectives of extension. List the various components of agricultural extension viz: method, extension, communication, extension administration and operation, extension programme planning and execution. Explain the reason for the wide difference between available scientific knowledge in farming and rural farmers' level of	Lecture materials.			

	farming and rural farmers' level of knowledge which needs to be bridged. 1.6 Be aware of the mass adoption of improved farm practices when the knowledge, attitude and skills of farmers are changed through agricultural extension education. 1.7 Understand the circumstances under which adults learn: when the method of learning is made informal; the learning process is not made cumbersome; the teacher is acceptable to them; the language and the approach adopted by the teacher are understood; the content of the learning is assessed to relate to their immediate	knowledge which needs to be bridged. Explain the mass adoption of improved farm practices when the knowledge, attitude and skills of farmers are changed through agricultural extension education. Help students to evaluate the circumstances under which adults learn: when the method of learning is				
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2	problems and would solve them; the teacher (extension agent) is assessed to be knowledgeable and capable of transmitting information effectively.	made informal; the learning process is not made cumbersome; the teacher is acceptable to them; the language and the approach adopted by the teacher are understood; the content of the learning is assessed to relate to their immediate problems and would solve them; the teacher (extension agent) is assessed to be knowledgeable and capable of transmitting information effectively.				
	General Objective: 2.0 Understand the principle of agricultural extensions.					
3	2.1 Learn the following features of extension education:	Explain the following features of extension education: i. as a means to help people to	As above			

	i. as a means to help people to help themselves; ii. as geared towards the clientele in their village where they live and work. iii. use of different methods to convey information; iv. use of local leaders and existing institutions; v. involvement of the local village dwellers in planning extension programmes. 2.2 Know the three important methods of contacting clientele e.g. individual, group and mass media methods. 2.3 Know how to apply each of the methods listed in 2.2 above according to the need of particular situations. 2.4 Identify instruments and	help themselves; ii. as geared towards the clientele in their village where they live and work. iii. use of different methods to convey information; iv. use of local leaders and existing institutions; v. involvement of the local village dwellers in planning extension programmes. List the three important methods of contacting clientele e.g. individual, group and mass media methods. Explain when each of the methods listed in 2.2 should be used according to the need of particular situations. Help students identify instruments and equipment that may be used in each				
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	equipment that may be used in each method adopted in 2.3 e.g. i. individual contact method uses spoken language handbills, bulletins. ii. Group contact method using extension demonstration plots, maps, loudspeaker etc. iii. Mass media method using radio, television, talking drum, film strip etc.	method adopted in above e.g. i. individual contact method uses spoken language handbills, bulletins. ii. Group contact method using extension demonstration plots, maps, loudspeaker etc. iii. Mass media method using radio, television, talking drum, film strip etc.				
	General Objective: 3.0 Understand the role of communication in extension.					
4	3.1 Know the definition of extension communication. 3.2 Learn the different elements in communication e.g. communicator, the message and the receiver of the message.	Define extension communication. List the different elements in communication e.g. communicator, the message and the receiver of the message.	As above			

	3.3 Understand the role of each of the elements in 3.2 above, in communication. 3.4 Know the characteristics of each element in 3.2 above in extension communication.	Describe the role of each of the elements in 3.2 in communication. Explain the characteristics of each element in 3.2 in extension communication.				
	General Objective: 4.0 Understand the concept of innovation and adoption in extension.					
5	4.1 Understand the concepts of innovation and adoption in extension education. 4.2 Know the characteristics of agricultural innovations/improved technologies. 4.3 Be aware of the general attitudes of rural farmers to innovations and how this attitude affects their rate of adoption in agriculture. 4.4 Know the different categories of adopters of agricultural innovation e.g. innovators, early adopter, late adopters, laggards or	Explain innovation and adoption in extension education. List the characteristics of agricultural innovations/improved technologies. Discuss the general attitudes of rural farmers to innovations and how this attitude affects their rate of adoption in agriculture. Identify the different categories of adopters of agricultural innovation e.g. innovators, early adopter, late adopters, laggards or non-	As above			

General Objective: 6.0 Understand the methods of creating teaching situations for adult learners.						
9	6.1 Understand the definition of the term teaching situation. 6.2 Know the various situations under which teaching and learning by adults can take place e.g. on extension demonstration plots, during study tours, field days etc. 6.3 Know how to plan and execute a successful field trip. 6.4 Know how to plan for and participate in agricultural shows and farmers festivals. 6.5 Learn how exhibits are displayed to visitors and how fairs and shows can pass for a learning situation.	Define the term teaching situation. List the various situations under which teaching and learning by adults can take place e.g. on extension demonstration plots, during study tours, field days etc. Describe how to plan and execute a successful field trip. Describe how to plan for and participate in agricultural shows and farmers festivals. Describe how exhibits are displayed to visitors and how fairs and shows can pass for a learning situation.	As above			
General Objective: 7.0 Understand the roles of local leaders in agricultural extension.						
10	7.1 Understand what a local leader does.	Describe a local leader. Describe the methods and	As above			

	7.2 Know the methods and roles of local leadership among various tribes in Nigeria. 7.3 Understand the merits and demerits of the use of local leaders in agricultural extension e.g. abuse of power, inaccessibility etc. 7.4 Know the definition and role of the para-professional in local extension. 7.5 Understand how paraprofessionals are trained for extension. 7.6 Know the various types of leaders in extension e.g. Democratic leaders, Authoritarian leader Charismatic leader. 7.7 Understand the value of intensive and continual training of leaders to improve	roles of local leadership among various tribes in Nigeria. Discuss the merits and demerits of the use of local leaders in agricultural extension e.g. abuse of power, inaccessibility etc. Define the term para-professional in local extension. Describe how paraprofessionals are trained for extension. Discuss the various types of leaders in extension e.g. Democratic leaders, Authoritarian leader Charismatic leader. Explain the value of intensive and continual training of leaders to improve their technical competence on the job.				
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	their technical competence on the job.					
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General Objective: 8.0 Understand the principles of extension administration.						
11	8.1 Know the roles of top personnel in extension administration e.g. extension specialist, subject matter specialists e.g. entomologists, soil scientists etc. 8.2 Understand the roles of intermediate and village level extension agents in extension work. 8.3 Know the main tasks of an extension administrator. 8.4 Know the advantages of training and retraining extension workers. 8.5 Know the different types of training opportunities open	Identify top personnel in extension administration e.g. extension specialist, subject matter specialists e.g. entomologists, soil scientists etc. Explain the roles of intermediate and village level extension agents in extension work. List the main tasks of an extension administrator. List the advantages of training and retraining extension workers. Describe the different types of training opportunities open to				

	to extension work e.g. the training and visit system (T & V). 8.6 Understand the “Up-Down” and “Down-Up” approaches in extension-development. 8.7 Understand the effectiveness of the extension system in Nigeria. 8.8 Know how a successful extension programme could be initiated, executed and appraised. 8.9 Know the definition of planned programme and work plan. 8.10 Distinguish between planned programme and work plan. 8.11 Understand when to use the methods of appraising extension programmes e.g. everyday observation,	extension work e.g. the training and visit system (T & V). Discuss the “Up-down” and “Down-UP” approaches in extension-development. Estimate the effectiveness of the extension system in Nigeria. Describe how a successful extension programme could be initiated, executed and appraised. Define planned programme and work plan. Distinguish between planned programme and work plan. Describe the methods of appraising extension programmes e.g. everyday observation, informal studies and explain when they are best used..				
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	informal studies.					
General Objective: 9.0 Know the role of Agricultural Research Institutes						
12	9.1 Understand the roles of Agricultural Research Institutes in the production of agricultural technologies and extension work.. 9.2 Know how to access the latest information from the appropriate arm/unit in Agricultural Research Institute for use by farmers. 9.3 Communicate research findings from Research Institutes to farmers and monitor its use. 9.4 Know how to identify farmers' problems and relay back to appropriate unit in the Agricultural Research Institute.	Explain the roles of Agricultural Research Institutes in the production of agricultural technologies and extension work. Show students how to access the latest information from the appropriate arm/unit in Agricultural Research Institute for use by farmers. Explain how to communicate research findings from Research Institutes to farmers and monitor its use. Explain how to identify farmers' problems and relay back to appropriate unit in the Agricultural Research Institute.	As above			

				Practical Contents:		
	General Objective: 10.0 Understand basic sociological concepts and elements making up the social systems.					
Week	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
13	7.1 Understand the definition of society. 7.2 Understand the concept of social organization. 7.3 Know the major social	Define society. Explain social organization. List and describe major social systems and values:- viz:	As above			

	systems and values:- viz: law abiding; devotion to duty; humility; piety etc. 7.4 Learn the social norms and beliefs of Nigerian society. 7.5 Understand the impact of Nigeria socio-cultural values on innovations 7.6 Understand:- social stratification; social class; caste system; ethnocentrism; cultural lag.	law abiding; devotion to duty; humility; piety etc. Classify and describe social norms and beliefs with respect to Nigerian society. Outline the impact of Nigeria socio-cultural values on innovations Explain:- social stratification; social class; caste system; ethnocentrism; cultural lag.				
	7.7 Know basic details of the following rural family types in	Describe the following rural family types in Nigeria:				

	Nigeria: Monogamy, polygamy, polyandry etc. 7.8 Know the different marital relationships in rural Nigeria e.g. patrilocal, matrilocal; abuncle – local etc. 7.9 Understand the roles of churches, mosques, peer groups, farmers’ associations, council of obas and chiefs in the rural social system.	Monogamy, polygamy, polyandry etc. Describe the different marital relationships in rural Nigeria e.g. patrilocal, matrilocal; abuncle – local etc. Explain the roles of churches, mosques, peer groups, farmers’ associations, council of obas and chiefs in the rural social system.				
General Objective: 11.0 Understand the organization and functioning of Nigerian rural institutions.						
14	8.1 Learn all the tribal groupings in Nigeria. 8.2 Know the areas occupied by the tribal groupings listed in 8.1 on a map of Nigeria. 8.3 Know the characteristics of the unit family among the following tribal groups in Nigeria:- Hausa, Ibo,	List all the tribal groupings in Nigeria. Locate the areas occupied by the tribal groupings listed in 8.1 on a map of Nigeria. Describe the characteristics of the unit family among the following tribal groups in Nigeria:- Hausa, Ibo,	As above			

	Yoruba; Fulani Edo; Efiki; Ibibio, Gwari; Ijaw; Tivs; Igalas; Birons; Angas; Idomas; The Jukuns. With regard to pattern of marriage; rearing of children; inheritance; extended family system.	Yoruba; Fulani Edo; Efiki; Ibibio, Gwari; Ijaw; Tivs; Igalas; Birons; Angas; Idomas; The Jukuns. With regard to - pattern of marriage; - rearing of children; - inheritance; extended family system.				
General Objective: 12.0 Understand the agents of social change and barriers to social change in Nigeria.						
15	9.1 Know the process of social change in society. 9.2 Understand the factors that affect the rate of social change in a society. e.g. Education, illiteracy,	Outline the process of social change in a society. Outline the factors that affect the rate of social change in a society. e.g. Education, illiteracy,	As above			

	religion, culture, imported culture, etc. 9.3 Know the agents of social change in Nigeria e.g. tourism, education, agriculture etc. 9.4 Understand how religious rural belief affects agricultural production in Nigeria e.g. sacred bushes; native holy days taboo animals and crops etc.	religion, culture, imported culture, etc. List and describe agents of social change in Nigeria e.g. tourism, education, agriculture etc. Explain how religious rural belief affects agricultural production in Nigeria e.g. sacred bushes; native holy days taboo animals and crops etc.				
	9.5 Know the culture – based barriers to rural social, change e.g. Tradition, beliefs, relative values etc. 9.6 Understand social barriers to change in the rural community e.g. responsibilities, social	Explain the culture – based barriers to rural social, change e.g. Tradition, beliefs, relative values etc. Discuss social barriers to change in the rural community e.g. responsibilities, social				

	structure. 9.7 Know psychological barriers to social change in rural communities e.g. attitudes of rural people to government personnel, towards gifts etc. 9.8 Understand communication as a factor in rural social change e.g. language, picture, learning problems.	structure. Explain psychological barriers to social change in rural communities e.g. attitudes of rural people to government personnel, towards gifts etc. Illustrate communication as a factor in rural social change e.g. language, picture, learning problems.				
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BASIC PRINCIPLES OF IRRIGATION SURVEYING

PROGRAMME: NATIONAL DIPLOMA (ND) IN IRRIGATION AGRONOMY TECHNOLOGY			
COURSE: Basic Principles of Irrigation Surveying	COURSE CODE: IAT 112		CONTACT HOURS: 60HRS
GOAL: Designed to provide students with knowledge of basic land survey for irrigation			
General Objective: On completion of the course, students should be able to: 1.0 Understand the basic principles and scope of Irrigation Surveying 2.0 Understand the use and methods of using linen and steel tapes in making linear measurements 3.0 Understand the principles of measurement of angles with theodolites and bearing with a magnetic compass. 4.0 Understand the basic principles and method of using total station and GPS equipment. 5.0 Understand the principles of survey computations and plotting.			

6.0 Understand setting out procedure for a farm building including access roads.						
General Objective: 1.0 Understand the basic principles and scope of Irrigation Surveying						
Course Specification: Theoretical Contents			Practical Content			
Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources	Evaluation

1.1	Explain the principles of working from 'whole to part' in irrigation Surveying and Geo-data works.	Describe the principles of working from 'whole to part' in irrigation Surveying and Geo-data works	White magic board, projector graphic set and calculator	measurement of linear distance of about 200m using linen/steel tape.	Accompany students to the field, guide them to perform measurement of linear distance of about 200m using linen tape	Chain, steel tape, ranging poles, staff, odometer, theodolite and GPS	Test, assignment and Examinations
1.2	State the importance of "Scientific honesty" made on observations.	Explain the importance of "Scientific honesty" made on observations.	White magic board, projector	measurements of horizontal and vertical angles with theodolite and compass to obtain average.	Guide the students to perform repetitive measurements of horizontal and vertical angles with theodolite and compass to obtain average	Chain, steel tape, ranging poles, staff, odometer, theodolite	Test, assignment and Examinations
1.3	Explain with examples the various "checks" made on field observation and during computation.	Describe using worked examples the various "checks" made on field observation and during computation.	map reading exercises		Guide the students to perform a map reading exercises- slope determination and direction, cross-sections. Contours, bearings, directions of river flows, and classifications of features such as settlement, roads and rail lines		Test, assignment and Examinations
1.4	Define errors of misclosure in surveys and describe						

methods of “balancing” the errors. 1.5 Describe the various classes of Survey and their order of accuracy 1.6 Distinguish between accuracy and precision	explain using worked examples various errors of misclosure in surveys and describe methods of “balancing” the errors. Discuss the various classes of Survey and their order of accuracy. Differentiate between accuracy and precision with examples					Test, assignment and Examinations Test, assignment and Examinations Test, assignment and Examinations
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2.3 Identify chain surveying instruments e.g. Linen tapes, steel tapes, ranging poles.		Identify chain surveying instruments		guide the students to properly identify them		Test, assignment and Examinations
2.4 State the necessary precaution in the use of instruments as stated in 2.3 above.	Explain in detail the necessary precaution in the use of above instruments					
2.5 State the criteria for selection in survey lines and offsets and the limitation lengths.	Discuss the criteria for selection in survey lines and offsets and the limitation lengths.					
2.6 Describe the methods of making linear measurements in chain surveys and the limiting conditions on measurement accuracy.	Explain the methods of making linear measurements in chain surveys and limiting conditions					
2.7 Explain common errors of building corners and wrong booking values.	State the common errors of building corners and wrong booking values.					Test, assignment and Examinations

2.8 Explain with sketches, the basic methods of check or proof lines, and the use of control frame work for position and orientation.	Discuss the basic methods of check or proof lines and the use of control frame work for position and orientation.					
2.9 Describe the general procedure for carrying out a chain survey.	Explain the general procedure for carrying out a chain survey.					
2.10 Illustrate the method of booking field measurements in chain surveys.	Sketch the method of booking field measurements in chain surveys.	Paper, pencil, eraser, Chain, tape, arrows and ranging poles.	Illustrate the method of booking field measurements in chain surveys.		Guide the students to carryout booking field measurements in chain surveys.	
2.11 Enumerate field problems and methods of overcoming them.	Discuss field problems and methods of overcoming them					
2.12 Identify errors in simple chain surveys.		Ranging poles, chains, pegs, hammer and mallet.	Identify errors in simple chain surveys		Guide the students to perform survey of an area of at least one hectare.	
						Test, assignment and Examinations

2.13 Carryout survey of an area of at least one hectare.		Ranging poles, Field book, Land, tape, chain, pegs and arrows.	Carryout survey of an area of at least one hectare.		Guide the students to book all field measurements	
2.14 Book all field measurements.		Ranging poles, Field book, Land, tape, chain, pegs and arrows	Book all field measurements.			

2.15 Plot surveying at a suitable scale.			lot surveying at a suitable scale	Guide the students to plot surveying at a suitable scale	Paper, pencil, eraser, drawing board and Computers.	
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2.16 Draw to field standards using conventional signs and hand lettering.			2.16 Draw to field standards using conventional signs and hand lettering	Guide the students to Draw to field standards using conventional signs and hand lettering	Paper, pencil, eraser, drawing board and Computers.	
General Objective: 3.0 Understand the principles of measurement of angles with theodolites and bearing with a magnetic compass.						
Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources	Evaluation

3.1Describe the various units of angular measurement e.g. the principles grade and radian measures, working out their conversion factors.	Explain the various units of angular measurement e.g. the principles grade and radian measurements and working out their conversion factors.					
3.2Explain the working principles of a Surveyors' Prismatic compass.	Discuss the working principles of a surveyors'prismatic compass					
3.3Describe the procedure of observation with a surveyors'prismatic compass.	Explain the procedure of observation with a surveyors' prismatic compass.					
3.4Explain the method of measurementusing theodolites.	Discuss the method of measurement using theodolites					
3.5Explain the difference in the reading procedure of a theodolite.	Discuss the difference in the reading procedure of a theodolite.					

3.6Carryout angular measurements with prismatic compass and theodolites.			3.6Carryout angular measurements with prismatic compass and theodolites	Guide students to carry out angular measurements with prismatic compass and theodolites	Prismatic compass and theodolites	
General Objective: 4.0 Understand the basic principles and method of using total station and GPS equipment.						
Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources	Evaluation
4.1Describe a total station and its accessories.	Explain total station and its accessories.	Magic board and projector				

4.2 Compare total station with a theodolite.	Explain the similarities and differences between total station and theodolite.					
4.3 Explain the working principles of a total station.	Discuss the working principles of a total station.					
4.4 Describe the procedures of observation with a total station.	Explain the procedures of observation with a total station.					
4.5 Carry out a simple survey using a total station.			4.5 Carry out a simple survey using a total station.	Guide the students to Carry out a simple survey using a total station.	Total station, log book and Computer.	
4.6 Retrieve the measured field data from total station onto a PC.			4.6 Retrieve the measured field data from total station onto a PC.	Guide the students on how to Retrieve the measured field data from total station onto a PC.		

4.7Process the data from the PC. 4.8Plot the plan of the surveyed area manually. 4.9Describe the various types of GPS equipment e.g. hand held and tripod types. 4.10 Explain the working observations on selected points.		Discuss the various types of GPS equipment e.g. hand held and tripod types. Describe the working observations on selected points		4.7Process the data from the PC.	Guide the students to Process the data from the PC.	Computer and printer.	
				4.8Plot the plan of the surveyed area manually	Guide the students to plot the plan of the surveyed area manually	Paper, Drawing Board, Drawing sets, Computer and Pencils.	
		General Objective: 5.0 Understand the principles of survey computations and plotting.					
Specific Learning Objective		Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources	Evaluation

5.1 Reduce the measured field data with a theodolite to obtain required angles.	Explain how to reduce the measured field data with a theodolite to obtain required angles					
5.2 Deduce bearings from the obtained angles.	Explain how to deduce bearings from the obtained angles.					
5.3 Carryout traverse computation to obtain coordinates.	Explain how to Carryout traverse computation to obtain coordinates					
5.4 Carryout traverse computation adjustment to obtain corrected (final) coordinates.	Discuss how to carryout traverse computation adjustment to obtain corrected (final) coordinates.					
5.5 Adjust compass bearings of the compass surveyed area.			Adjust compass bearings of the compass surveyed area.	Guide the students on how adjust compass bearings of the compass	Compass, metal objects.	

				surveyed area.		
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5.6 Carry out the computation as in 5.5 above.			5.6 Carry out the computation as in 5.5 above	Guide the students to Carry out the computation as in 5.5 above		
5.7 Retrieve the measured field data of the surveyed area by a total station onto a PC.			5.7 Retrieve the measured field data of the surveyed area by a total station onto a PC.	Guide the students to retrieve the measured field data of the surveyed area by a total station onto a PC.		
5.8 Process the data using the PC.			5.8 Process the data using the PC.	Guide the students to Process the data using the PC.	Computers and Printers.	
5.9 Plot the plan of the surveyed area manually at different scales (small, medium and			5.9 Plot the plan of the surveyed area manually at different scales (small,	Guide the students to plot the plan of the surveyed area manually at different scales (small, medium and	Paper, pencils, Razors, scale rule, Drawing sets and	

large).			medium and large).	large).	Calculators.	
General Objective: 6.0 Read, interpret and make measurements from maps, lay-out and engineering plans.						
Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources	

6.1 State the use of different types of map e.g. topographical, engineering and guide maps.	Explain the use of different types of map e.g. topographical, engineering and guide maps.	Magic board, projector				
6.2 Explain the principles of map scale.	Discuss the principles of map scale.					
6.3 State the relationships between map scales or representative fractions and the contour interval.	Explain the relationships between map scales or representative fractions and the contour interval					
6.4 Identify map symbols and conventional signs.		Magic board, projector	Identify map symbols and conventional signs.	Guide the students to identify map symbols and conventional signs	Various symbols and maps	
6.5 Explain the basis and use of map symbols and conventional signs	Discuss the basis and use of map symbols and conventional signs					

6.6 Identify various Nigerian map series.	Explain various Nigerian maps					
6.7 Interpret various Nigerian map series	Elaborate various Nigerian Map Series.					
6.8 Describe various method of showing relief on maps e.g. spot heights, hachures and contours.	Explain various methods of showing relief on maps e.g. spot heights, hachures and contours					
6.9 Define map grids.	explain the meaning of map grids.					
6.10 Explain how to use map grids.			6.10 Use map grids to identify locations on a map.	Guide the students on how to use map grids.	Maps, pencils, calculators, rulers.	

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6.11 Explain how to establish different reference directions e.g. true north, grid north and magnetic north.	Discuss how to establish different reference directions e.g. true north, grid north and magnetic north.					
6.12 Define the relationship between the different direction i.e. convergence, declination and compass variation.	Explain the relationship between the different direction i.e. convergence, declination and compass variation.					
6.13 Discuss how to scale off-grid coordinates.	Explain how to Scale off-grid coordinates					
6.14 Interpret different types of map, layout plans and diagrams/sketches.	Discuss how to Interpret different types of map, layout plans and diagrams/sketches					
6.15 Identify simple planimetric details on imageries.			Identify simple planimetric details on imageries	Guide students on how to identify simple planimetric details on imageries	GPS, Maps, Printers and PC.	
6.16 Discuss how to measure	Explain how to measure					

distances from curves of a given diagram.	distances from curves of a given diagram.					
6.17 Determine radius of curves from given diagram.	Explain how to determine radius of curves from given diagram.					
6.18 Explain how to read-off direction/bearing between given features.	Discuss how to read-off direction/bearing between given features					
6.19 Describe different map reference systems.	Explain the different map reference systems.					

PROGRAMME: **National Diploma in Irrigation Agronomy Technology**

COURSE: **IAT 113 - Principles of Irrigation Practices.**

DURATION: **(2 Hours Lectures, 1 Hours Practical)**

UNITS: **3.0**

GOAL: **This course is designed to equip the students with basic Concepts and Skills of Irrigation**

GENERAL OBJECTIVES:

On completion of this module, the student should be able to:

- 1.0 Understand the concept of irrigation in arid and humid regions.**
- 2.0 Understand history of irrigation.**
- 3.0 Understand the sources of irrigation water.**

- 4.0 Understand effects of water stress on crop growth.**
- 5.0 Understand Energy Concepts in Irrigation and Pumps.**
- 6.0 Understand the future trend of Irrigation**
- 7.0 Understand irrigation water application methods and scheduling**

PROGRAMME: NATIONAL DIPLOMA IN IRRIGATION AGRONOMY TECHNOLOGY		
PROGRAMME: NATIONAL DIPLOMA IN IRRIGATION AGRONOMY TECHNOLOGY		
COURSE: INTRODUCTION TO IRRIGATION PRACTICE	COURSE CODE: IAT 113 Credit Unit 3.0	CONTACT HOURS: (2 hours lecture: 1 hours practical)
Goal: This course is designed to equip the students with basic skills of irrigation.		
General Objective: On completion of this module, the student should be able to 1 .Understand the concept of irrigation in arid and humid regions. 2. Understand history of irrigation. 3. Understand the sources of irrigation water. 4. Understand effects of water stress on crop growth. 5. Understand Energy Concepts in Irrigation and Pumps. 6. Understand the future trend of Irrigation 7.Understand irrigation water application methods and scheduling		

General Objective: 1.0 Understand the concept of irrigation in arid and humid regions						
COURSE SPECIFICATION: Theoretical Contents:				Practical Contents:		
Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources	
1.1 Define Irrigation	Define irrigation.	LCD projector, slide projector, white board, markers.				
1.2 Explain the importance of irrigation in terms of its prospects and potential in Nigeria	Highlight the importance and potential of Irrigation in Nigeria.					
1.3 Differentiate between irrigation and drainage.	Distinguish between Irrigation and Drainage	LCD projector, white board, markers and demonstration farm, Charts,				

1.4 Explain the problems associated with irrigation	Discuss irrigation problems.	LCD projector, slide projector, charts				
1.5 Describe irrigation practices in the arid region as different from irrigation in humid region	Discuss the practices of irrigation in the arid regions and the irrigation practices in the humid regions		Identify Irrigation and Drainage sites	Guide the students to differentiate between Irrigation	Site visits and excursion	
	General Objective 2.0 Understand history of Irrigation					
2.1 Explain the origin of Irrigation	Highlight the origin of irrigation from the ancient Egyptian Civilization	LCD projector, slide projector, white board, markers and maps, charts				

2.2 Explain the impact of irrigation on increased agricultural production	Discuss the role of irrigation water as a critical requirement of crop growth and development					
2.3 Explain the contributions of the irrigation projects in Nigeria especially the River Basin Development authorities	Discuss the contributions of the irrigation projects in Nigeria especially the River Basin Development authorities (eg; Hadejia - Jama'are River Basin Development Authority, Ogun- Osun River Basin Development Authority, Lower Benue River Basin Development Authority, Cross River Basin Development Authority, etc)					
2.4 List the major water borne diseases that are associated with irrigation schemes	Enumerate the different types of water borne diseases associated with irrigation schemes					

especially large irrigation schemes						
General Objective 3.0 Understand the sources of Irrigation Water.						
Theory			Practical			
Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources	Evaluation
3.1 Explain sources of water for irrigation.	Outline sources of irrigation water. Surface (river, dams, lakes, etc) and Ground water (well water, boreholes, spring ,etc) Explain confined and	LCD projector, slide projector, white board, markers.	Identify sources of irrigation water.	Take students on excursion to nearby dams, rivers, streams and lakes where irrigation activities take place.	Suitable visit sites.	

3.2 State the forms in which ground water exists.	unconfined aquifers, springs					
3.3 Estimate ground water yield.	Explain physical 'yield' and 'discharge'		Estimate ground water yield.	Guide the students to undertake pumping test.	Water pumps, stop watch. Measuring cylinder and water source.	

	General Objective 4.0 Understand the effects of Water stress on Crop growth					
Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources	Evaluation
4.1 Define the concept of water stress.	Define water stress.	LCD projector, slide projector, white board, markers.				
4.2 List the signs of water stress on crops.	Outline the various signs of water stress on crops.		Observe the effect of water stress on the Appearance of crops.	Accompany the students to site to observe the signs of water stress on crops.	Seedlings Field crops etc	
4.3 Discuss ways of overcoming water stress on crops	Explain ways of overcoming water stress on crops. E.g. Mulching, crop selection, plant population,					

	irrigation scheduling and proper land preparation					
General Objective 5.0 Understand Energy Concepts and Irrigation Pumps						
Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources	Evaluation
5.1 Explain the meaning of Pump	Describe the different pumps used in irrigation Discuss the		Identify types of irrigation pumps Demonstrate the	Guide student to identify types of irrigation Pump Guide the students to carryout	Different pumps	

5.2 Explain the Characteristics of pumps and the 3 basic different types of Irrigation pumps • positive displacement (rotary lobe, progressive, rotary gear, piston, diaphragm, screw, gear and hydraulic pumps) • Centrifugal pumps (radial, axial and mixed flow) • Axial flow (Propeller pumps) 5.3 State criteria for pump selection.	Characteristic s of pumps and the 3 basic different types of Irrigation pumps as in 5.2	Text Books, LCD projector, Charts, White boards, markers	servicing of irrigation pumps.	servicing of Different types of pumps used in irrigation.	Pumps	
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5.4 Explain the working principles of selected pumps	Discuss the criteria for pump selection.					
5.5 Discuss the different source of power to drive irrigation pumps • Combustion Engine • Electric motors • Solar Power	Describe the working principles for pumps selection.	Text Books, LCD projector, Charts, White boards, markers				
5.6 Explain the energy concepts of irrigation - Pressure - Force - Work	Describe the different source of power to drive irrigation pumps as in 5.5	Text Books, LCD				

		projector, Charts, White boards, marker				
	General Objective 6.0 Understand irrigation water application methods and scheduling.					
Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources	Evaluation
6.1 Describe different water application methods in irrigation e.g. surface irrigation, sub-surface irrigation, sprinkler irrigation and drip system. 6.2. Explain the factors that determine choice of irrigation methods.	Explain different water application methods in irrigation as in 6.1 Describe the factors	LCD projector, slide projector, white board, markers.	Observe irrigation water application methods.	Visit existing Irrigation projects to show the students how to maintain and operate different water application methods.	Crop fields, irrigation pumps and source of water. .	

6.3 Explain how to schedule irrigation to make optimum use of water.	influencing the choice of irrigation methods. Describe irrigation Scheduling methods based on crop, climate and soil parameters .		Practice irrigation schedule methods.	Show students how to schedule irrigation.	Field Checkbook	
6.4 Calculate the depth of water application in irrigation.	Determine the depth of water application in irrigation using worked data.					
	General Objective 7.0 Understanding the future Trend in Irrigation					
Specific Learning	Teachers	Learning	Specific Learning	Teachers	Learning	Evaluation

Objective	Activities	Resources	Objective	Activities	Resources	
7.1 Explain the Increased cropping intensities under irrigation	Discuss the Increased cropping intensities under irrigation	LCD projector, slide projector, white board, markers.	Practice continuous cropping (vegetables) on an irrigated land by ensuring irrigation water supply	Guide the students to perform continuous cropping (vegetables) on an irrigated land by ensuring irrigation water supply	School demonstration farm	
7.2 Explain the socio-economic benefits of irrigation practices - Increased earning - Increased standard of living - Increased social harmony	Discuss the socio-economic benefits of irrigation practices as in 7.2					

• Food security • Increased quality of life		LCD projector, slide projector, white board, film and video clips				
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PROGRAMME: National Diploma in Agricultural Technology

COURSE: AGT 111 - Principles of Crop Production

DURATION: 60 hours (2 Hours Theory, 2 Hours Practicals)

UNITS: 4.0

GOAL: To acquaint the students with the principles and practices of crop production.

General Objectives:

On completion of this course the student should be able to:

- 1.0 Identify and understand the scope of crop production in Nigeria.
- 2.0 Understand the different cropping systems.
- 3.0 Understand the principles and practices of tillage.
- 4.0 Understand the different methods of propagating plants.
- 5.0 Understand and practise successful weed control in crop production
- 6.0 Understand the principles and practices of manuring and fertilising.
- 7.0 Understand the principles and practices of crop protection.

8.0 Understand the principles and practices of harvesting, storage and product handling.

PROGRAMME: National Diploma in Agricultural Technology

COURSE: AGT 111 - Principles of Crop Production

DURATION: 60 hours (2 Hours Theory, 2 Hours Practicals)

UNITS: 4.0

GOAL: To acquaint the students with the principles and practices of crop production.

General Objectives:

On completion of this course the student should be able to:

- 9.0 Identify and understand the scope of crop production in Nigeria.
- 10.0 Understand the different cropping systems.
- 11.0 Understand the principles and practices of tillage.
- 12.0 Understand the different methods of propagating plants.
- 13.0 Understand and practise successful weed control in crop production
- 14.0 Understand the principles and practices of manuring and fertilising.
- 15.0 Understand the principles and practices of crop protection.
- 16.0 Understand the principles and practices of harvesting, storage and product handling.

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: PRINCIPLES OF CROP PRODUCTION	COURSE CODE: AGT 111	CONTACT HOURS: 60 HOURS (2 hrs lectures, 2 hours practicals)
GOAL: To acquaint the students with the principles and practices of crop production.		
COURSE SPECIFICATION:		Practical Contents:
	General Objective: 1.0 Identify and understand the scope of crop production in	

	Nigeria.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	1.1 Understand the scope of crop production. 1.2 Know the objectives of crop production. 1.3 Understand the importance of crop production to agriculture.	Explain and demonstrate the scope and objectives of crop production. List and explain the principles and application of crop production in agriculture.	LCD projector Slide projector White board Markers. Laptop computers.	See the scope and importance of crop production by visiting a range of crop production enterprises.	Accompany students on scoping visits and explain what they are seeing.	Suitable visit venues.
2	1.4 Appreciate the factors affecting crop production e.g. i. environmental factors; ii. economic factors; iii. social factors.	Explain the factors affecting crop production.	LCD projector Slide projector White board	See how specific factors affect the choice of cropping systems.	Accompany students on visits and explain what they are seeing.	Suitable visit venues.

			Markers. Laptop computers.			
	General Objective: 2.0 Understand the different cropping systems.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
3	2.1 Understand the following cropping systems: i. mixed cropping; ii. crop rotation; iii. monoculture; iv. relay cropping 2.2 Understand the advantages and disadvantages of different cropping systems. 2.3 Evaluate and select cropping	Explain cropping systems and explain the advantages and disadvantages of each. Introduce methods of evaluation.	LCD projector Slide projector White board Markers. Laptop computers.	Identify the different cropping systems. Selection of cropping system to	Guide students to identify the different cropping systems. Help students to evaluate and make a decision	College and private farms.

4	systems to suit different situations.		LCD projector Slide projector White board Markers. Laptop computers.	suit a practical situation.	on cropping for a given field situation.	College or private farm.
General Objective: 3.0 Understand the principles and practices of tillage.						
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
5	3.1 Understand the term “tillage” and be aware of the requirements for seedbed production.	Explain the term “tillage” and the concept of seed requirements for germination and survival. Explain how implements, animals and machines are used to produce seedbeds	LCD projector Slide projector White board Markers. Laptop computers.	See examples of seedbed preparation for different crops using different implements. Carry out tillage operations in field.	Demonstrate examples of seedbed preparation for different crops using different implements. Guide student to carry out tillage operations.	College farms.
6	3.2 Understand how to produce suitable seedbeds.		LCD projector Slide projector			Tractor, hoes, ox-drawn tillage implements and

			White board Markers. Laptop computers.			land.
	General Objective: 4.0 Understand the different methods of propagating plants.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
7	4.1 Understand the difference between sexual and asexual propagation. 4.2 Decide which of the two methods of propagation in 4.1 above to use. 4.3 Be able to determine the quality of planting materials.	Explain the difference between asexual and sexual propagation and why each is used. Emphasize the quality of planting materials. Introduce students to the different planting methods.	LCD projector Slide projector White board Markers. Laptop computers.	Identify and understand the different methods of propagation in practice. How to test for seed viability.	Guide students to identify the different methods of propagation. Show students how to determine the viability of seeds. Guide students to plant seeds.	Crop seeds, cuttings, bulbs, rhizomes, leaves and tubers.
8	4.4 Know about the different planting methods: i. in situ; ii. drilling; iii.dibbling;		LCD projector Slide projector	Plant seeds using the different methods at the appropriate time		Seeds, containers, compost and growing chambers.

	iv.broadcasting. 4.5 Understand supplying and thinning and determine when to supply or thin.	Explain the concepts of supplying and thinning.	White board Markers. Laptop computers.	Supply seeds or seedlings and thin seedlings.	Guide students to thin and supply seeds where necessary.	Seeds, containers, compost and growing chambers.
	General Objective: 5.0 Understand and practise successful weed control in crop production.			Practical Contents:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
9	5.1 Have a basic understanding of the definition and classification of weeds. 5.2 Identify some common weeds within the ecological zone. 5.3 Appreciate the effects of weeds on growing crops. 5.4 Understand how weeds can be controlled. 5.5 Know the different generic types	Introduce the range of weeds in Nigeria and explain their importance. Explain how weeds are controlled by chemical and non-chemical methods.	LCD projector Slide projector White board Markers. Laptop computers. LCD projector	Field identification and classification of weeds. Identify different types of herbicides	Guide students to identify and classify weeds. Students should make a weed album. Guide students to identify herbicides and calibrate	Weed identification textbooks and standard weed album. Herbicides containers, spraying equipment,

10	of herbicides. 5.6 Identify common manufactured herbicides in use and apply them to crops.		Slide projector White board Markers. Laptop computers.	and calibrate herbicide application equipment and machinery.	herbicide and application equipment and machinery.	spraying machinery, tractors.
	General Objective: 6.0 Understand the principles and practices of manuring and fertilising.			Practical Contents:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
11	6.1 Know the objectives of manuring and fertilizing. 6.2 Identify the different types of manure and fertilizer in use. 6.3 Prepare some manures like compost and farm yard manures.	Explain the objectives of manuring and describe the different types of manure in use.	LCD projector Slide projector White board Markers. Laptop computers.	Identify the different types of manures and fertilizers. Prepare compost.	Guide students to identify different manures and fertilizers. Guide students to make compost.	Inorganic fertilizers Sheep and goat manure, cow dung, poultry litter, pig litter. Grass, water, ash, compost pit.

12	6.4 Understand the time and rate of application of manures and fertilizers. 6.5 Recognize and understand the following terminologies:- i. fertilizer ratio; ii. fertilizer rate; iii. active nutrients. 6.6 Appreciate the importance of nutrient elements found in manures and fertilizers. 6.7 Understand the methods used to apply manures and fertilizers on crops.	Explain time and rate of manure and fertilizer application. Define manure ratio and fertilizer rate. Help students to calculate nutrient content of fertilizers and manures. Describe application methods.	LCD projector Slide projector White board Markers. Laptop computers.	Apply manures and fertilizers.	Assist students to apply manures and fertilizers.	Fertilizer, manures and application machinery.
	General Objectives: 7.0 Understand the principles and practices of crop protection.			Practical Contents:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
13	7.1 Understand the terms pests and diseases in relation to crop production.	Define pest and disease and list common pest and	LCD projector Slide projector	Identify common pests and diseases of field crops and	Guide students to identify common pest	Pests and disease albums

14	7.2 List the common pests and diseases of crops in the field and in storage.	diseases of crops.	White board Markers. Laptop computers.	stored products.	and diseases of field crops and stored products.	Pesticides and application machinery. Crops.
	7.3 Identify some common pests and diseases of field crops.	Describe physical and economic effects of pest and diseases.				
	7.4 Appreciate the effects of these pests and diseases on field crops and stored products.					
	7.5 Know which pest control measures should be adopted both in the field and storage especially biological, chemical and integrated methods.	Explain time of application of pesticides and the advantages and disadvantages of pest and disease control methods.		Practise pest and disease control measures.	Guide students to perform pest and disease control measures.	
	7.6 Understand the advantages and disadvantages of various pest and disease control measures.		LCD projector Slide projector White board Markers. Laptop computers.			
	General Objective: 8.0 Understand the principles and practices of harvesting, storage and product handling.			Practical Contents:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning	Teachers	Learning

				Objective	Activities	Resources
15	8.1 Understand the concept of 'harvesting'. 8.2 List the factors guiding harvesting time. 8.3 Identify harvesting tools and equipment. 8.4 Know the procedures for transporting and storing and preserving harvested products. 8.5 Know the procedures for primary processing of freshly harvested products. 8.6 Identify agricultural products preservation structures e.g. cribs rhombus barns, silos etc.	Define harvesting and factors guiding harvest timing. Explain harvest methods and machinery. Explain how crops are safely transported and stored, short and long term. Explain primary processing.	LCD projector Slide projector White board Markers. Laptop computers.	Identify harvesting tools and equipment. Carry out harvesting of named field or tree crop. See practical successful storage systems.	Guide students to identify harvesting tools and carry out harvesting operation. Accompany students to see crop storage.	Cutlasses, hoes, threshers, combine harvesters. Suitable visit venues.

Suggested assessment:

3 in-class test @ 20% each = 60%

2 short projects @ 20% each = 40%

PROGRAMME: **National Diploma in Agricultural Technology**

COURSE: **AGT 112 - Elements of Agricultural Economics**

DURATION: **30 Hours (2 Hour Lectures)**

UNITS: **2.0**

GOAL: **This course is designed to give the students a good background in basic economic principles as applicable to agriculture.**

GENERAL OBJECTIVES:

On completion of this course the student should be able to:-

- 1.0 Know the meaning of economics as applied to agriculture.
- 2.0 Understand demand and supply in economics.
- 3.0 Know the determination of market price.
- 4.0 Know the principles and application of elasticities.
- 5.0 Know the theory and application of the concept of production function.
- 6.0 Know the various types of costs and revenue.

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE: ELEMENTS OF AGRICULTURAL ECONOMICS	COURSE CODE: AGT 112	CONTACT HOURS: 30 HRS

GOAL: This course is designed to give the students a good background in basic economic principles as applicable to agriculture						
COURSE SPECIFICATION:				Practical Contents:		
	General Objective: 1.0 Know the meaning of economics as applied to agriculture.					
Week	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	1.1 Understand the concepts of economics and agricultural economics. 1.2 Understand the relationship between economics and other social sciences. 1.3 Identify and understand economic problems. 1.4 Be aware of the concepts of scarcity, choice. 1.5 Understand the relationships between such concepts as	Define economics and explain agricultural economics. Explain the relationship between economics and other social sciences. Identify and explain economic problems.	LCD projector Slide projector White board Markers. Laptop computers.			

2	scarcity, choice, opportunity cost etc.	Define the concepts of scarcity, choice. Explain the relationships between such concepts as scarcity, choice, opportunity cost etc.	LCD projector Slide projector White board Markers. Laptop computers.			
	General Objective: 2.0 Understand demand and supply in economics.					
3	2.1 Understand demand and the law of demand. 2.2 Understand the mathematical and diagrammatic representation of demand. 2.3 Understand the factors	Explain demand and state the law of demand. Illustrate demand with diagrams and equations.	LCD projector Slide projector White board Markers.			

4	affecting the demand for a commodity.	Explain the factors affecting the demand for a commodity.	Laptop computers.			
	2.4 Understand the relationship between change in the level of demand and movement along the demand curve.	Explain the relationship between change in the level of demand and movement along the demand curve.	LCD projector			
	2.5 Understand the different types of demand.	Explain the different types of demand.	Slide projector			
			White board			
5			Markers.			
	2.6 Understand supply and the law of supply.	Explain supply and state the law of supply.	Laptop computers.			
	2.7 Understand the mathematical and diagrammatic representation of supply.	Illustrate supply with diagrams and equations.				
	2.8 Understand the factors affecting the supply of a commodity.					
5	2.9 Understand the relationship between change in the level of supply and movement along the supply curve.	Explain the factors affecting the supply of a commodity.	LCD projector			
	2.10 Understand the		Slide projector			
			White board			

6	different types of supply.	Explain the relationship between change in the level of supply and movement along the supply curve. Explain the different types of supply.	Markers. Laptop computers. LCD projector Slide projector White board Markers. Laptop computers.			
	General Objective: 3.0 Know the determination of market price.					
7	3.1 Know the relationship between the forces of demand and supply in a free market economy. 3.2 Understand the effect of demand being greater,	Explain the relationship between the forces of demand and supply in a free market economy. Illustrate the effect of demand being greater,	LCD projector Slide projector White board Markers. Laptop computers.			

	smaller or equal to supply.	smaller or equal to supply.				
8	3.3 Determine equilibrium price from simultaneous linear equations.	Show how to determine equilibrium price from simultaneous linear equations.	LCD projector Slide projector White board			
9	3.4 Know the principle of price control. 3.5 Understand why prices of agricultural products fluctuate more than those of manufactured goods.	Explain the principle of price control. Explain why prices of agricultural products fluctuate more than those of manufactured goods.	Markers. Laptop computers. LCD projector Slide projector White board Markers. Laptop computers.			

	General Objective: 4.0 Know the principles and application of elasticities.					
10	4.1 Understand price elasticities of demand and supply, cross-elasticity of demand. 4.2 Compute the various values of elasticities from simple tables and information. 4.3 Draw the various coefficients with appropriate diagrams. 4.4 Know various values of elasticities of price income and cross elasticities of demand.	Explain price elasticities of demand and supply, cross-elasticity of demand. Show how to compute the various values of elasticities from simple tables and information. Explain how to draw the various coefficients with appropriate diagrams. Explain various values of elasticities of price income and cross elasticities of demand.	LCD projector Slide projector White board Markers. Laptop computers.			
11	4.5 Comprehend the importance of both elasticities of demand and supply as related to agriculture.	State the importance of both elasticities of demand and supply as related to agriculture.	LCD projector Slide projector White board Markers.			

			Laptop computers.			
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	General Objective: 5.0 Know the theory and application of the concept of production function.					
12	5.1 Understand the concept of “factors of production”. 5.2 Know the meaning of production function. 5.3 Distinguish between the curves of the production function.	Explain the concept of “factors of production”. Explain the meaning of production function. Explain the difference between the curves of the production function.	LCD projector Slide projector White board Markers. Laptop computers.			

	6.5 Know how to represent costs, revenue and profit with diagrams.	and profit with diagrams.	Laptop computers.			
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PROGRAMME: National Diploma in Agricultural Technology

COURSE: AGT 113 - Introduction to Soil Science

DURATION: 60 HOURS (2 Hours Lectures, 2 Hours Practicals)

UNITS: 4.0

GOAL: To acquaint students with the origin, properties and characteristics of farm soils.

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:

- 1.0 Understand rocks and minerals as parent materials of soils.
- 2.0 Understand the physical characteristics of soils.
- 3.0 Understand chemical properties of soils.
- 4.0 Understand soil characteristics.
- 5.0 Understand soil moisture and its importance.
- 6.0 Understand soil organic matter and its importance
- 7.0 Understand soil organisms and their impact on nature of soils.

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE: INTRODUCTION TO SOIL SCIENCE		COURSE CODE: AGT 113			CONTACT HOURS: 60 HOURS (2 hrs lectures: 2 hrs practicals)	
GOAL: To acquaint students with the origin, properties and characteristics of farm soils.						
COURSE SPECIFICATION:				Practical Contents:		
	General Objective: 1.0 Understand rocks and minerals as parent materials of soils.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources

1	1.1 List the different types of rocks and state their origin (i) Igneous rock (ii) Sedimentary rock (iii) Metamorphic rock	Explain soil formation and different types of rock.	LCD projector Slide projector White board Markers. Laptop computers.	1.1 Identify common types of rocks and their minerals constituents 1.2 Draw different rock samples 1.3 Describe types of rock	Initiate a walking trip.	Rock and Soil samples.
2	1.2 Understand the processes of weathering (i) Physical weathering (ii) Chemical weathering (iii) Biological Weathering	Explain the processes of weathering and its agents.	LCD projector Slide projector White board Markers. Laptop computers.	See examples of weathering of rocks.	Accompany students on field trip.	Suitable visit venues.
	General Objective: 2.0 Understand the physical characteristics of soils.					

WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
3	2.1 Understand the definition of soil. Know soil characteristics and how they affect soil fertility.	Define and explain its characteristics. Discuss soil texture and its importance	LCD projector Slide projector White board Markers.	- Identify different types of soil	- Show different types of soil	Soil Samples
4	2.2 Understand the meaning of soil texture, its importance, and the different textural classes of soils. 2.3 Learn about soil structure and explain its importance 2.4 Know about the different ways of improving	- Explain textural triangle - emphasize the importance of soil structure and describe. - Discuss the significance of air, water and temperature in the soil. - Guide students to	Laptop computers.	- Identify different textural classes. - Identify soil as a material source. - Understand the different types of soil structure.	- Show different textural classes. - Explain soil as a material source. - Demonstrate the different types of soil structure.	

5	soil structure 2.5 Understand clay, sand and silt and their properties. 2.6 Appreciate the significance of air, and water in the soil. 2.7 Understand soil depth and its importance in soil nutrient supply.	know ways of improving soil structure. - Differentiate Between sand, silt and clay. - Demonstrate soil depth.	LCD projector Slide projector White board Markers. Laptop computers.	- Understand the differences between sand, silt and clay. Draw different textural classes	- Demonstrate the differences between sand, silt and clay. Show different textural Classes.	Soil Samples
	General Objective: 3.0 Understand chemical properties of soils.					

WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
6	3.1 Know about soil colloids and basic principles of ionic exchange.	Explain to students soil colloidal properties cation exchange, soil aeration and porosity.	LCD projector Slide projector White board Markers. Laptop computers.	Learn how to carry out acidity tests.	Guide the students on how to test alkaline and acidic soil	Soil samples. pH meter Conductivity Meter
7	3.2 Understand the importance of cation exchange 3.3 Understand the importance of soil aeration 3.4 Enumerate the effects of acidity on soils 3.5 List the characteristics of alkali soils 3.6 List the effects of alkalinity on soils	Explain soil acidity, its causes and how it affects crop productivity. Explain how soil acidity can be prevented and cured.			Explain to students soil colloidal properties, cation exchange, soil aeration and porosity.	

8	3.7 Understand the importance and methods of liming 3.8 Know about saline soils. 3.9 Understand how soil salinity affects nutrient availability 3.10 Appreciate the impact of liming on soil acidity and nutrient availability to crops.	- Define and explain the causes of saline soil. - Enumerate soil nutrient availability as affected by salinity - Enumerate soil nutrient availability as affected by liming.	LCD projector Slide projector White board Markers. Laptop computers.	Differentiate between saline and acidic soil by carrying out soil tests.	Differentiate between saline and acidic soils. Guide the students on how to test alkaline and acidic soils	Soil samples. pH meter Conductivity meter.
	General Objective: 4.0 . Understand soil characteristics.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources

9	4.1 Understand soil characteristics influencing plant nutrition	Explain the most important soil characteristics influencing plant growth e.g. organic matter.	LCD projector Slide projector White board Markers. Laptop computers.	See plants growing in different soil types.	Demonstrate plants growing in different soil types.	Plants and soils.
	General Objective: 5.0 Understand soil moisture and its importance.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
10	5.1 Learn about soil moisture 5.2 List the different types of soil moisture 5.3 Identify available forms of soil moisture and	Discuss soil moisture in relation to plant nutrition, Define soil moisture.	LCD projector Slide projector White board Markers. Laptop	Illustrate the importance of soil moisture on nutrients availability to crops by simple experiment.	Guide the students on how to carry out simple experiment	Soil sample, seed of crops, water ,fertilizer.

	the unavailable forms.	Discuss the different forms of soil moisture.	computers.	See the effects of soil water and air using samples and the addition of water to demonstrate waterlogging, saturation, field capacity etc.	in soil moisture and nutrients availability Demonstrate waterlogging, saturation, field capacity etc.	Soil samples, water supply.
	General Objectives: 6.0 Understand soil organic matter and its importance.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
11	6.1 State the origin of soil organic matter 6.2 List the factors affecting the quality and quantity of organic	Describe different types of soil organic matter. Describe factors	LCD projector Slide projector White board Markers. Laptop	Prepare compost and farmyard manure.	Demonstrate compost and farmyard manure preparation.	- plant matter - ash - water

WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
13	7.1 Know the macro-fauna of the soil: Earthworms, squirrels and rodents (mammals). Snakes, termites, crickets etc.	List the different soil organisms and discuss their importance to soil ecology.	LCD projector Slide projector White board Markers. Laptop computers.	Learn how to identify soil macrofauna.	Demonstrate how to identify soil macrofauna.	Macrofauna samples.
	7.2 Understand the functions of the micro-fauna of the soil e.g. nematodes, and the problems they can cause.	Discuss the types and functions of soil microfauna.	LCD projector Slide projector White board Markers. Laptop computers.	Learn how to identify soil microfauna.	Demonstrate how to identify soil microfauna.	Microfauna samples.
14	7.3 List and describe	Describe micro			Demonstrate	

15	macroflora of the soils. 7.4 List micro-flora of the soils: Bacteria\Algae Fungi\Actinomycetes and appreciate their function.	and macro flora found in the soil and explain their function.	LCD projector Slide projector White board Markers. Laptop computers.	Learn how to identify soil macro and micro flora.	how to identify soil macro and micro flora.	Macro and micro flora samples.
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Suggested assessment:

5 in-class or practical tests @ 20% each = 100%

PROGRAMME: National Diploma in Agricultural Technology

COURSE: AGT 115 – Introduction to Agricultural Marketing

DURATION: 30 Hours (2 Hour Lectures)

UNITS: 2.0

GOAL: This course is designed to give the students a good background in basic marketing principles as applicable to agriculture.

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GENERAL OBJECTIVES:

On completion of this course the student should be able to:-

7.0 Understand the basic concepts and processes of marketing.

8.0 Understand the fundamental concepts of segmentation, targeting and positioning.

- 9.0 Identify and understand the individual elements of the extended marketing mix.
- 10.0 Apply the marketing mix to different agricultural market segments and contexts.

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE: INTRODUCTION TO AGRICULTURAL MARKETING		COURSE CODE: AGT 115		CONTACT HOURS: 30 HRS		
GOAL: This course is designed to give the students a good background in basic marketing principles as applicable to agriculture						
COURSE SPECIFICATION:				Practical Contents:		
	General Objective: 1.0 Understand the basic concepts and processes of marketing.					
Week	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning	Teachers	Learning

				Objective	Activities	Resources
1	1.1 Be aware of the alternative definitions of marketing and understand the terminology of marketing e.g. customers, consumers, needs, wants, value, satisfaction, exchange relationships.	Describe and explain the alternative definitions of marketing and introduce students to the terminology of marketing.	LCD projector Slide projector White board Markers. Laptop computers.			
	1.2 Understand the evolution of agricultural marketing and how successful businesses have adopted the concept.	Explain how marketing has evolved and how businesses use marketing to achieve successful profitability.				
2	1.3 Have an overview of the marketing process including audit, integration, SWOT analysis, setting objectives, constraints and scope.	Give students an overview of how businesses plan their	LCD projector Slide projector White board Markers. Laptop computers.			

	General Objective: 2.0 Understand the fundamental concepts of segmentation, targeting and positioning.					
5	2.1 Identify and understand the macro (political, legal, cultural, economic, ecological, ethical and technological) and micro (employees, suppliers, customers, financiers, pressure groups and competitors) factors which influence agricultural marketing decisions. 2.2 Understand the dimensions of buyer behaviour and the factors which affect it e.g. demographics, psychology, wealth, motivation, lifestyle etc.	Help students to understand and evaluate those factors which affect the marketing strategy of a business. Explain how buyers and consumers behave in the marketplace and why.	LCD projector Slide projector White board Markers. Laptop computers.			
6			LCD projector			

9	the 4P and 7P market mixes. Understand the meaning of products and brands, product mix, product life-cycle and product development.	‘marketing’ and ‘extended marketing’ mix and explain how “products” are developed and sold.	Slide projector White board Markers. Laptop computers.			
	3.2 Understand the concept of “place”, customer convenience and availability, distribution systems, management and logistics.	Introduce the concept of “place” and discuss with students its importance.	LCD projector Slide projector White board Markers. Laptop computers.			
10	3.3 Know how to set prices for goods by considering perceived value, demand elasticity, competition, costs of production, psychology of purchase and social responsibility.	Explain and discuss the concept of “price” and how it is used in marketing to achieve profit.	LCD projector Slide projector White board			
	3.4 Know how to promote products by using a mix of elements such as					

11	advertising and packaging, promotions, public relations, direct marketing, personal selling, branding, internet marketing etc. 3.5 Understand the additional elements of the marketing mix i.e. the product-service continuum, people, physical evidence and process management.	Help students understand the concept of “promotion” and discuss the different options available to a rural business. Introduce students to the latest ‘extended marketing mix’ theory in more detail.	Markers. Laptop computers. LCD projector Slide projector White board Markers. Laptop computers.			
12			LCD projector			

			Slide projector White board Markers. Laptop computers.			
	General Objective: 4.0 Apply the marketing mix to different agricultural market segments and contexts.					
13	4.1 Understand the national consumer markets for agricultural produce and how to tailor the marketing mix to suit each sector.	Explain what consumer markets are available for agricultural produce and services.	LCD projector Slide projector White board Markers. Laptop computers.			
14	4.2 Be aware of other markets such as organizational and service markets e.g. Governments, industrial, non-profit making, service users, service products and quality.	Explain what other markets are available and how they differ from fast moving consumer markets.	LCD projector Slide projector White board Markers.			

15	4.3 Understand the importance of international markets on agricultural products and services. Globalization, international marketing strategies.	Explain the concept of globalization, international markets, export management, price influences etc.	Laptop computers. LCD projector Slide projector White board Markers. Laptop computers.			
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Suggested assessment:

2 multiple choice exams @ 50% each = 100%

	Program:	Course code: COM001		Contact hours: 3 hours/week
	Subject/Course: Computer Applications 1			Theoretical: 0 hours/week
	Year:1 Semester:1	Pre-requisite:	None	Practical: 3 hours/week

General Objectives

1. Understand computer basics and use the operating system.
2. Use a word processing package.
3. Use a spreadsheet package(Excel).

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	Department:	Course code: G103	Contact hours: 3 hours/week
	Subject/Course: Computer Applications 1		Theoretical: 0 hours/week
	Year:1 Semester:1	Pre-requisite: None	Practical: 3 hours/week

General Objective1: To understand computer basics and to use the operating system						
	Theoretical contents			Practical contents		
Week/s	Specific learning outcomes	Teacher's activities	Resources	Specific learning outcomes	Teacher's activities	Resources
1				Identify • What is computer . • Computer system • How a computer works	Explain: What is a software What is an operating system. To be able to use: the desktop	Networked PC Lab Appropriated operating system

				• Hardware. • Software • Software application	icons the taskbar the start menu	Appropriated exercises stored on each PC Internet access Smart board/ white board
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4				Know how to: Navigate to different drives and folders and drives Use windows explorer to manage folders. Use windows explorer to manage files.	Demonstrate: How to navigate to different folders and drives How to create select, , delete, , rename, move, copy a folder. How to create select, , delete, restore, rename, move, copy a files. Use the search command to look for specific files.	Networked PC Lab Appropriated operating system Appropriated exercises stored on each PC Internet access Smart board/ white board
General Objective2: To use correctly a word processing package.						
2				Know how to: Start / End the applications. Identify the main parts of word processing applications.	Demonstrate: How to Start/End an application. main part of the word processing software	Networked PC Lab Word processing packages Appropriated exercises stored on

						each PC Internet access Smart board/ white board
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3				Know how to Format a document Format characters Format paragraphs Type and edit a short text Copy move blocs of text. Find and replace a text Save the document.	Demonstrate: How to open and close one or several documents. How to switch between open documents How to create a new document (based on default or other available template). How to save document to a location on a drive. How to save the document with different format. TXT, HTML	Networked PC Lab Word processing packages Appropriated exercises stored on each PC Internet access Smart board/ white board
5				Know how to Prepare the document	Demonstrate: How to edit a document, typing, inserting text, selecting text, inserting additional text, rearranging blocks of text, deleting	Networked PC Lab Word processing

					blocks of text, search and replace text ,undo changes, formatting text, styles, change font typeface and size, font styles and effects, change text colour, highlight text ,copy formatting, clear formatting, formatting paragraphs, indent paragraph. .	packages Appropriated exercises stored on each PC Internet access Smart board/ white board
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6				Know how to handle Graphics	Demonstrate: Symbols, special characters, equations, illustrations, pictures, smartart, resize graphics	Networked PC Lab Word processing packages Appropriated exercises stored on each PC Internet access Smart board/ white board
7				Know how to Create and use table efficiently. Insert, edit data in a table.	Demonstrate: Inserting a table. Inserting, editing data in a table. Selecting rows, columns, cells, entire table. Inserting, deleting, rows and	Networked PC Lab Word processing packages Appropriated

					columns. Modifying column with, row height. Modifying cell borders and shadings.	exercises stored on each PC Internet access Smart board/ white board
8				Know how to: Proofread a document, spelling and grammar , thesaurus, customize autocorrect, create a new default dictionary, check word count, page formatting, modify page margins and orientations ,apply a page border and colour, insert common header and footer information , create a page break.	Demonstrate: Proofreading a document, spelling and grammar , thesaurus, customize autocorrect, create a new default dictionary, check word count, page formatting, modify page margins and orientations ,apply a page border and colour, insert common header and footer information , create a page break.	Networked PC Lab Word processing packages Appropriated exercises stored on each PC Internet access Smart board/ white board

General Objective3: To use correctly a Spreadsheet g package.(Excel)						
9				Know how to: Start stop the Excel application Identify different elements of Excel Create, Save, Open and Close a worksheet. Work with cells, rows and columns..	Demonstrate: How to start and stop the application To show: The different elements of a spreadsheet application To demonstrate: How to move around he worksheet using the mouse and using the keyboard Enter samples of data into a cell Create a new spreadsheet using the default template, Save, Open and Close an Excel. Select a cell, a range of adjacent cells, a range of non-	Networked PC Lab Excel Package Appropriated exercises stored on each PC Internet access Smart board/ white board

					adjacent cells, Entire rows, Entire columns Entire worksheet. Insert /Delete rows, columns in a worksheet. Modify column widths, row heights.	
10				Know how to: Enter different types of data • text • numbers • date • time Format data and present them correctly	Demonstrate: Enter different types of data Edit and modify the content of a cell Move, copy, Delete, the content of a cell (within a worksheet or between worksheets), Use the auto fill facilities to fill a rang cells with numbers, dates, days Format cells to display numbers to a specific number of decimal places.	Networked PC Lab Excel package Appropriated exercises stored on each PC Internet access

					to display numbers with, without commas to indicate thousands. Format cells to display date style. Format cells to display a currency symbol. Format cells to display numbers as percentages. Change cell content appearance: font sizes, font types and colour. Apply formatting to cell contents such as: bold, italic, underline, double underline.	Smart board/ white board
11				Know how to Format cell by applying colours borders and alignments.	Demonstrate: How to Apply different colours to cell content, cell background. Copy the formatting from a cell, cell range to another cell, cell range. Apply text wrapping to	Networked PC Lab Excel package

					contents within a cell. Align contents in a cell, cell range: left, centre, right, top, bottom. Centre a title over a cell range. Adjust cell content orientation. Add border effects to a cell, cell range.	Appropriated exercises stored on each PC Internet access Smart board/ white board /
12				Know how to Generate formulas using cell references and arithmetic operators.	Demonstrate How to Work with a workbook ,save a workbook, open a workbook, entering data.	Networked PC Lab Excel package Appropriated exercises stored on each PC Internet access

						Smart board/ white board
13				Know how to Generate formulas using standard functions.	To demonstrate: How to Generate formulas using standard functions such as sum, average, minimum, maximum, count, functions. How to the insert function wizard to generate a formulas that implements t	Networked PC Lab Excel package Appropriated exercises stored on each PC Internet access Smart board/ white board
14				Know how to Create a chart using Autosum, linking work sheets, sort and filter..	Demonstrate: How to Use Autosum, linking work sheets, sort and filter..	Networked PC Lab Excel package Appropriated exercises stored on each PC Internet access Smart board/ white

						board /
15				Know how to: Format a chart Add a title, label to the chart/graph. Remove a title, label from the chart/graph Change the chart/graph type Change the background colour in a chart/graph. Change the column, bar, line, pie slice colours in the chart/graph. Duplicate, move charts/graphs within a worksheet, between open spreadsheets. Resize, delete charts/graphs.	Demonstrate how to: Format a chart Add a title, label to the chart/graph. Remove a title, label from the chart/graph Change the chart/graph type Change the background colour in a chart/graph. Change the column, bar, line, pie slice colours in the chart/graph. Duplicate, move charts/graphs within a worksheet, between open spreadsheets. Resize, delete charts/graphs.	Networked PC Lab Excel package Appropriated exercises stored on each PC Internet access Smart board/ white board /

ASSESSMENT (%)					
	Continuous	Mid Semester	End Semester	Total	
Practical	20	20	60		100

Programme: Irrigation Agronomy Technology: National Diploma

Course: GNS 111 Citizenship Education

Duration: 30 hours (2 hours theory per week)

Unit: 2

Goal: To raise awareness and understanding of individual rights and responsibilities as a citizen of Nigeria

General Objectives:

1.0: Understand the Constitution of Nigeria

2.0: Understand the federal system of government in Nigeria

3.0: Know the constitutional rights and obligations of Nigerian citizens

4.0: Understand Citizenships

5.0: Fundamental objectives and directive principles of state policy in Nigeria

Course: CITIZEN EDUCATION		Course Code: GNS 111	Contact Hours 2HRS/WEEK
Course Specification: Theoretical Content			
	General Objective 1.0: Understand the Constitution of Nigeria		
Week	Specific Learning Outcome:	Teacher Activities	Resources
1 - 4	1.1 Explain the term constitution 1.2 Distinguish the different types of constitution	Ask the students: 1. what their understand by the term constitution and to	Chalkboard, duster

	1.3 Highlight some provisions of an International Constitution 1.4 Explain the effectiveness of International Constitution 1.5 Explain the supremacy of the Nigerian Constitution to other laws with emphasis on the 1989 constitution 1.6 Evaluate the main parts of the Nigeria Constitution 1.7 Draft a constitution for an association 1.8 Trace the historical development of the Nigerian Constitution 1.9 Discuss the merits and demerits of each of the Nigerian constitutions 1.10 Explain the concept of "rule of law"	distinguish the different rules of constitution known 2. to explain the effectiveness of International Constitution 3. to explain Nigerian Constitution to other laws. 4. To identify the main parts of the Nigerian Constitution. 5. Assess to the students by given the assignment to draft a constitution for an association	
	General Objective 2.0: Understand the federal system of government in Nigeria		
Week	Specific Learning Outcome:	Teacher Activities	Resources
5 - 7	2.1 Describe a federation 2.2 Distinguish a federation from a confederation 2.3 Outline the basis for the federal system in Nigeria 2.4 Examine the evolution, structure and functions of the federal system in Nigeria. 2.5 Analyse the relationships among the three tiers of government in Nigeria 2.6 Evaluate the revenue allocation formula in operation in Nigeria 2.7 Compare and contrast other federation with Nigeria	Ask the students: 6. to describe a federation and to differentiate between a federation and a confederation 7. to define the functions of the federal system in Nigeria and the relationship among the three tiers of government 8. to evaluate the revenue allocation formula operation in Nigeria	Chalk, blackboard, duster
	General Objective 3.0: Know the constitutional rights and obligations of Nigerian citizens		
Week	Specific Learning Outcome:	Teacher Activities	Resources
8 - 9	3.1 Examine the significance of rights and obligations in Nigeria	Ask the students to identify the responsibilities and duties of	Chalk,

	3.2 Assess government's protection of fundamental rights as contained in the Nigerian constitution	Nigerian citizenship	blackboard, duster
	3.3 Evaluate the responsibilities and duties of Nigerian citizenships and the benefits for performing them 3.4 Assess the responsibilities and duties of constituted authority to the people 3.5 Evaluate the responsibilities and duties of government to the people		
	General Objective 4.0: Understand Citizenships		
Week	Specific Learning Outcome:	Teacher Activities	Resources
10 - 12	4.1 Discuss the significance of citizenship 4.2 Analyse the principles and benefits of citizenship 4.3 Explain the difference in the modes of acquiring citizenship 4.4 Evaluate the merits and demerits of each type of citizenship 4.5 Analyse the basis for the acquisition and withdrawal of Nigerian citizenship 4.6 Examine the benefits derivable from Nigeria citizenship	Ask the students: - to discuss and analyse the principles and benefits of citizenship - to analyse the basis for the acquisition and withdrawal of Nigerian citizenship	Chalk, blackboard, duster
	General Objective 5.0: Fundamental objectives and directive principles of state policy in Nigeria		
Week	Specific Learning Outcome:	Teacher Activities	Resources
13 - 15	5.1 State the fundamental obligations of government as provided in the constitution 5.2 Explain the general provisions of the fundamental objectives and directive principles of state policy 5.3 Explain the political, economic, social and education policies of Nigeria	Ask the students to explain the directive principles and policy of the Nigerian government on cultures, the mass media, national ethnics and duties of the citizen	Chalk, blackboard, duster

	5.4 Explain the directive principles and policy of the Nigerian government on culture, the mass media, national ethics and duties of the citizen 5.5 Assess the conformity observance and application of the fundamental objectives and directive principles of state policy by governments and people of Nigeria. 5.6 Recommend improvements on the provision conformity, observance and application of the fundamental objectives and directive principles of state policy		
	ASSESSMENT: The continuous assessment, tests and quizzes will be awarded 40% of the total score. The end of the Semester Examination will make up for the remaining 60% of the total score.		

PROGRAMMES: GENERAL STUDIES

COURSE TITLE: COMMUNICATION IN ENGLISH I

CODE: GNS 102

PREREQUISITE: GNS 101

DURATION: 2 HOURS PER WEEK (30 HOURS PER SEMESTER)

CREDIT UNITS: 2.0

SCHEDULE: 2ND SEMSTER

GOALS: This course is designed to enable students acquire the necessary communication skills, know the techniques of correspondence and comprehend written materials.

GENRAL OBJECTIVES:

On completion of the course the student should:

1.0 Understand the concept of communication.

2.0 Know how to make oral presentations.

3.0 Know the essential elements of correspondence.

4.0 Know the rules of comprehension and interpretation.

PROGRAMME: NATIONAL VOCATIONAL CERTIFICATE IN GENERAL STUDIES						
COURSE:COMMUNICATION IN ENGLISH			COURSE CODE: GNS 102		CONTACT HOURS:2 hrs	
GOAL: This course is designed to enable students acquire the necessary communication skills, know the techniques of correspondence and comprehend written materials.						
COURSE SPECIFICATION: Theoretical Contents:				Practical Contents:.		
	General Objective: 1.0 Understand the concept of communication.					
WEEK	Specific Learning Objective Theory	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	1.1 Define communication. 1.2 Analyze the process of communication.	- Define communication. - Analyze the process of communication.				
2	1.3 Analyse the purposes of communication. 1.4 Explain the relationship	- Analyse the purposes of communication. - Explain the				

	between communication and language.	relationship between communication and language.				
3	1.5 Explain the impact of interference on communication at various levels, e.g. phonological, syntactic, etc. 1.6 Explain code-mixing, code-switching and dissonance in communication.	- Explain the impact of interference on communication at various levels, e.g. phonological, syntactic, etc. - Explain code-mixing, code-switching and dissonance in communication.	•	•	•	
	General Objectives:2.0 Know how to make oral presentations.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	
	Theory					
4	Oral Presentations 2.1 Label a diagram of the organs of speech.	Label a diagram of the				

	2.2 Describe the functions of the organs in 2.1 above in speech production.	organs of speech. Describe the functions of the organs in 2.1 above in speech production.				
5	2.3 List the phonemes of English. 2.4 Produce correctly each of the phoneme listed in 2.3 above.	- List the phonemes of English. - Produce correctly each of the phoneme listed in 2.3 above.				
6	2.5 Pronounce correctly by making distinctions between the different sound contrast in the consonantal and vowel systems of English.	Pronounce correctly by making distinctions between the different sound contrast in the consonantal and vowel systems of English.				
7	2.6 Explain the principles of effective speaking, viz, correct use of stress, rhythm, and intonation patterns. 2.7 Read fluently.	- Explain the principles of effective speaking, viz, correct use of stress, rhythm, and intonation patterns. - Read fluently.				

	General Objectives: 3.0 Know the essential elements of correspondence.				General Objectives:	
WEEK	Specific Learning Objective Theory	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
8	Correspondence 3.1 List the various type of correspondence, e.g. letter, memo, circular, etc. 3.2 Explain the various parts of a letter.	- List the various type of correspondence, e.g. letter, memo, circular, etc. - Explain the various parts of a letter.				-
9	3.3 Differentiate between formal and informal letter formats. 3.4 Explain the characteristics of styles suitable for formal and informal letters.	- Differentiate between formal and informal letter formats. - Explain the characteristics of styles suitable for formal and informal letters.				
10	3.5 Explain the functions of the first, middle and last paragraph. 3.6 Write a formal and an informal letter.	- Explain the functions of the first, middle and last paragraph. - Write a formal and an informal letter.				

	General Objectives: 4.0 Know the rules of comprehension and interpretation.				General Objectives:	
WEEK	Specific Learning Objective Theory	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
11	4.1 Identify main ideas in a given passage. 4.2 Differentiate the main ideas from the details in a passage.	- Identify main ideas in a given passage. - Differentiate the main ideas from the details in a passage.	•			
12	4.3 Use the main idea to anticipate specific details in a passage. 4.4 Use context clues to aid comprehension.	- Use the main idea to anticipate specific details in a passage. - Use context clues to aid comprehension.	•			
13	4.5 Identify relationship patterns of ideas in a passage. 4.6 Use context clues such as definitions, restatements and examples to derive meaning.	- Identify relationship patterns of ideas in a passage. - Use context clues such as definitions, restatements and examples to derive meaning.	•			
14	4.7 Explain how affixes modify meanings. 4.8 Interpret figurative language in a passage.	- Explain how affixes modify meanings. - Interpret figurative language in a passage.	•			
15	4.9 Draw conclusions from available information.	Draw conclusions from available information.	•			

PROGRAMME: IRRIGATION AGRONOMY TECHNOLOGY NATIONAL DIPLOMA (ND)			
COURSE: IRRIGATION AGRONOMY I	CODE: IAT121	Credit Unit:	CONTACT HOURS:
GOAL: The course is designed to enable the students understand the concept of irrigation, its principles and application for optimum crop production			
GENERAL OBJECTIVE 1.0: on completion of the course , the students should be able to: 1.0 know irrigation scheduling and delivery systems 2.0 know the components of irrigation systems 3.0 know soil moisture sensing instruments 4.0 know critical periods for soil moisture stress of crops 5.0 know irrigation efficiency			
GENERAL OBJECTIVE 1.0: know irrigation scheduling and delivery systems			
THEORETICAL CONTENT	PRACTICAL CONTENT		

Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
1.1 define irrigation scheduling	Explain the meaning of irrigation scheduling	Magic board, marker, projector, Textbooks,				Test ,quize, examination
1.2 Explain irrigation delivery systems	Describe different irrigation delivery systems	Magic board, marker, projector, Textbooks,	Identify different irrigation delivery systems	Guide students to identify different irrigation delivery systems.	Suitable irrigation sites.	Test, quize, reports, and examination
GENERAL OBJECTIVE 2.0: know the components of irrigation systems						
THEORETICAL CONTENT			PRACTICAL CONTENT			

Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
2.1 List the components of the different types of irrigation systems.	Outline the components of the different types of irrigation systems.	White marker board, textbooks, projector, flip chart, slides, etc				Test, quiz, practical reports, examination
2.2 Explain the functions of the components as in 2.1 above.	Elucidate irrigation system components as in 2.2	White marker board, textbooks, projector, flip chart, slides, etc	Identify various irrigation system components as in 2.2	Guide the students to identify the various components of irrigation systems	Sprinkler head, nozzle head, pumping machine, perforated pipes, etc.	Test, quiz, practical reports, examination
GENERAL OBJECTIVE 3.0: know soil moisture sensing instruments						
THEORETICAL CONTENT			PRACTICAL CONTENT			

Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
3.1 Explain soil moisture	Discuss soil moisture	Textbooks, white marker board, marker, projector				Test, quiz ,and examination
3.2 Explain soil moisture sensing instruments eg. Tensiometer,wir eless soil moisture sensor, soil moisture tester, etc.	Describe soil moisture sensing instrument as in 3.2	Textbooks, white marker board, marker, projector	identify soil moisture sensing instrumentsas in 3.2	Guide the students to identify soil moisture sensing instruments as in 3.2	Tensiometer,wireless soil moisture sensor, soil moisture tester ,etc	Test, quiz, practical reportsand examination
GENERAL OBJECTIVE 4.0: know critical periods for soil moisture stress of crops						
THEORETICAL CONTENT			PRACTICAL CONTENT			
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
4.1Define Critical period	Explain critical period	Textbooks, white board, marker, projector, slidese.t.c				Test, quiz, examination

4.2 Explain the signs of soilmoisture stress e.g wilting, flower and fruits abortion	Elaborate on soilmoisture stress as in 4.2	Textbooks, white board, marker, projector, slides,e.t.c	Identify signs of soilmoisture stress of crops as in 4.2	Guide the students to identify signs of soil moisture stress ofcrops.	Suitable irrigation sites, demonstration plots,crops,etc	Test, quiz, practical reports examination
4.3Explain the critical periods of moisture stress of crops	Describe the critical periods of moisture stress of crops	Same as above	Identify the critical periods of moisture stress on crops	Guide the students to identify the critical periods of moisture stress on crops	As in 4.2 above	Test, quiz, examination
GENERAL OBJECTIVE 5.0: know irrigation efficiency						
THEORETICAL CONTENT			PRACTICAL CONTENT			
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
5.1Explain water application efficiency	Elaborate on water application efficiency	Whiteboard, marker, projector, flipchart e.t.c	Identify various sources of water loss in irrigation system	Guide the students to identify various sources of water loss in irrigation system	Suitable sites.	Test, quiz, examination

5.2 Describe water distribution efficiency	Explain water distribution efficiency	As in 5.1				
5.3 Explain crop water use efficiency	Discuss crop water use efficiency	As in 5.1				As in 5.1
						As in 5.1

PROGRAMME: NATIONAL DIPLOMA IN IRRIGATION AGRONOMY TECHNOLOGY			
COURSE: Soil-Water Plant Relations	CODE: IAT122	Credit Unit: 3	CONTACT HOURS: 45
GOAL: Design to provide the students the knowledge of basic relationship between crop roots and soil moisture regimes			
GENERAL OBJECTIVE: On completion of this course, the student should be able to: 1.0 Understand the role of water in plants 2.0 Understand the plant rooting characteristics 3.0 Understand the moisture movement in crops 4.0 Understand water absorption processes in crop 5.0 Understand basic Evapotranspiration processes in crop and it's microenvironment			

GENERAL OBJECTIVE: Understand the role of water in plants						
THEORETICAL CONTENT			PRACTICAL CONTENT			
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
1.1 Explain the role of water in plant life	Discuss the importance of water in various activities of plants	Board, marker,	Illustrate turgidity, placidity and photosynthesis	Guide the students to identify turgidity, placidity and photosynthesis.	plant cells and microscope/projectors	Test/quiz
1.2 Explain forms of water in the soil	Discuss forms of water in the soil e.g gravitational water, capillary water, available water and unavailable water	Board, marker	Illustrate forms of water in the soil e.g gravitational water, capillary water, available water and unavailable water.	Guide the students to identify forms of water in the soil	Soil, water, capillary tubes	Test/quiz
1.3 Explain how water provide thermal stability in plant	Describe how water provide thermal stability in plant	Board, marker				Test/quiz
GENERAL OBJECTIVE 2.0: Understand the plant rooting characteristics						

THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
2.1 Explain the different types of rooting pattern of crops	Describe the various rooting pattern of different crops	Board/ marker, crop samples, drawings/pictures of different roots of crops	Identify and compare the different types of crop roots	Guide the students to identify and compare different types of crop roots.	Samples of crop roots, e.g shallow, medium, deep and very deep roots.	Class test/quiz and log book assessment.
2.2 Explain the effective root zone depths of different crops	Discuss the effective root zone depths of different crops	Board/marker	Identify the effective root zone depths of different crops	Guide the students to identify effective root zone depths of different crops	Laboratory, various crop samples, measuring devices, etc	Test/quiz
2.3 Explain root traits in relation to plant productivity	Describe root traits in relation to plant productivity e.g root length, density and root diameter	Board/marker				Test/quiz
2.4 Explain						

root growth and water variation						
GENERAL OBJECTIVE 3.0 Understand the soil moisture regimes in relation to crop growth						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
3.1 Explain the moisture extraction depth for crops	Discuss the moisture extraction depth for crops	Board/marker, drawings/pictures				Test and short quiz
3.2 Explain moisture extraction pattern in crops	Discuss moisture extraction pattern in crops					
3.3 Explain the moisture sensitive and	Discuss the moisture sensitive and					

critical periods of different crops	critical periods of different crops					
GENERAL OBJECTIVE 4.0: Understand water absorption processes in crops						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
4.1 Explain the two water absorption processes namely; active and passive absorption in crops	Discuss the meaning of both active and passive processes involved in water absorption by crops.	Board/marker and projectors				Test and quiz
4.2 Explain the factors affecting water absorption	Describe the factors affecting water absorption by crops. Eg atmospheric, plant and soil factors					

GENERAL OBJECTIVE 5.0: Understand basic Evapotranspiration processes						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
5.1 Explain the meaning of evapotranspiration	Discuss the meaning of evaporation and transpiration.	Board/marker/cleaner				Test and quiz
5.2 Explain the importance of Evapotranspiration (ET)	Discuss the importance of Evapotranspiration (ET)	Board/marker/cleaner				
5.3 Enumerate the factors affecting Evapotranspiration	List the factors affecting Evapotranspiration (ET)					

PROGRAMME: IRRIGATION AGRONOMY TECHNOLOGY (NATIONAL DIPLOMA)			
COURSE: IRRIGATION OF HORTICULTURAL CROPS	CODE: IAT 123	Credit Unit:	CONTACT HOURS:
GOAL: The course is designed to teach the students basic principles of irrigated horticultural crops production.			

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PROGRAMME: NATIONAL DIPLOMA IRRIGATION AGRONOMY TECHNOLOGY						
COURSE: IRRIGATION OF HORTICULTURAL CROPS CODE: IAT 123 Credit Unit: 3.0 CONTACT HOURS: 45						
GENERAL OBJECTIVES: on completion of the course, the students should be able to: 1.0 Understand the concepts of horticultural crops under irrigation 2.0 Understand the scope of horticulture and classify horticultural crops 3.0 Know how to select suitable irrigation methods for horticultural crops production. 4.0 Know the agronomic practices for irrigated horticultural crops production 5.0 Know the water requirements of horticultural crops 6.0 Know the critical stages of horticultural crops growth under irrigation. 7.0 Understand the concept of irrigation water management						
GENERAL OBJECTIVE 1.0 Understand the concepts of horticultural crops under irrigation						
THEORETICAL CONTENT			PRACTICAL CONTENT			
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
1.1 Define Horticulture	Explain Horticulture.	White board, marker, projector, charts etc				Quiz
1.2 List the various classes	Outline the various classes of horticultural crops.	White board, marker, projector, charts etc				

ses of horti cult ural crop s. E.g vege tabl es, fruit s and orna men tal crop s. 1.3 Describe the relationship between irrigation and horticulture 1.4 State the benefits of producing horticultural crops under	Discuss the relationship between irrigation and horticulture Discuss the benefits of producing horticultural crops under irrigation	White board, marker, projector, charts etc					
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irrigation						
GENERAL OBJECTIVE 2.0: Understand the scope of horticulture and classify horticultural crops						
THEORETICAL CONTENT			PRACTICAL CONTENT			
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
2.1. Describe the scope of horticulture	Explain the scope of horticulture	White board, marker, projector, charts etc				
2.2 Explain the importance of horticultural crops eg economic benefit, nutrition/health benefits, soil and environment	Discuss the importance of horticultural crops as in 2.2	White board, marker, projector, charts etc				

benefits						
GENERAL OBJECTIVE 3.0: Know how to select suitable irrigation methods for horticultural crops production.						
THEORETICAL CONTENT			PRACTICAL CONTENT			
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
3.1 List different irrigation methods suitable for horticultural crops. Eg surface, sprinkler and drip	Discuss the different irrigation methods suitable for horticultural crops.	White board, marker, projector, charts etc	Identify irrigation methods suitable for horticultural crops.	Guide the students to identify irrigation methods suitable for horticultural crops.	Suitable irrigation farm	Practical log books and quiz
3.2 Enumerate the factors to be considered in the	Explain the factors to be considered in the selection of irrigation method	White board, marker, projector, charts etc				quiz

selection of irrigation method for horticultural crops. eg crop type, soil type, weather, etc 3.3 List the challenges in the use of irrigation for horticultural crops production E.g over irrigation leading to water wastage, spread of disease causing organisms, smoke emission from water pumps, high energy use	for horticultural crops Discuss the challenges in the use of irrigation for horticultural crops production as in 3.3	White board, marker, projector, charts etc					
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GENERAL OBJECTIVE 4.0: Know the agronomic practices for irrigated horticultural crops production						
THEORETICAL CONTENT			PRACTICAL CONTENT			
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation

4.1 Explain Good Agronomic Practices (GAP) for horticultural crops (site selection, land preparation, fertilization, weed control, harvest and post-harvest operations, etc). 4.2 Discuss Nursery practices for horticultural crops under irrigation such as seedbed/seed trays preparation, sowing, fertilizer application, mulching, etc	Discuss Good Agronomic Practices (GAP) for horticultural crops as in 4.1 Expound on nursery practices as in 4.2 Discuss Screen house, green house,	White board, marker, projector, charts etc White board, marker, projector, charts etc White board, marker, projector, charts etc	Demonstrate Good Agronomic Practices (GAP) in horticultural crops production. Carryout basic nursery practices for horticultural crops production. under irrigation	Guide students to carry out Good Agronomic Practices (GAP) in horticultural crops production in the field. Guide the students to carryout basic nursery practices for horticultural crops production. under irrigation	School farms, farm inputs, farm tools/implements, etc School orchard, other suitable farms, farm inputs, farm tools/implements, etc Visit to farms where Screen house, green house, hydroponics, vertical farming are available	Practical log book, quiz, test Practical log book, quiz, test, practice of raising nursery. Practical log book, quiz, test
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4.3 Explain Screen house, green house, hydroponics, vertical farming etc. 4.4 Define vegetative propagation of horticultural crops. 4.5 List the vegetative propagules of horticultural crops e.g corms, rhizomes, bulbs, stolon, suckers, etc 4.6 Explain the vegetative propagation of	hydroponics, vertical farming etc. Briefly explain vegetative propagation of horticultural crops. Outline the vegetative propagules of horticultural crops as in 4.5. Discuss the vegetative propagation of horticultural crops	White board, marker, projector, charts etc	Identify Screen house, green house, hydroponics, vertical farming etc. in the production of some horticultural crops. Carry out budding, grafting etc as vegetative propagation methods for horticultural	Accompany students to Visit farms where Screen house, green house, hydroponics, vertical farming are available. Guide the students to carry out budding, grafting, etc as vegetative propagation methods for horticultural crops	Screen house, green house, hydroponics, vertical farm Budding knives, scions, budding tapes, rootstock, etc	Practical log book, quiz, test
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horticultural
crops e.g
budding and
grafting, etc

crops

GENERAL OBJECTIVE 5.0 Know the water requirements of horticultural crops

THEORETICAL CONTENT			PRACTICAL CONTENT			
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
5.1 Discuss water requirements of horticultural crops.	Explain water requirements of horticultural crops.	White board, marker, projector, charts etc	Determine soil moisture using tensiometer, etc.	Guide the students to Determine soil moisture using tensiometer, etc..	Tensiometer. field,etc.	Practical log book, quiz
5.2 List factors affecting frequency of irrigation in horticultural crops. eg crop type, soil type, weather	Enumerate factors affecting frequency of irrigation in horticultural crops as in 5.2	White board, marker, projector, charts etc				
5.3 Explain how to determine soil moisture using tensiometer, etc.	Discuss how to determine soil moisture as in 5.3.	White board, marker, projector, charts etc				

5.4 Explain how to calculate water requirement of some important horticultural crops using worked examples.	Discuss how to calculate water requirement of some important horticultural crops using worked examples.	White board, marker, projector, charts etc				
GENERAL OBJECTIVE 6.0: Know the critical moisture stress stages of horticultural crops grown under irrigation.						
THEORETICAL CONTENT			PRACTICAL CONTENT			
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
6.1 Explain the critical stages of horticultural crops grown under irrigation. 6.2 Explain the effects of moisture	Discuss the critical stages of horticultural crops grown under irrigation. List the effects of moisture stress on horticultural crops grown under	White board, marker, projector, charts etc White board, marker, projector, charts etc	Identify the effects of moisture stress on horticultural crops grown under	Guide the students to identify the effects of moisture stress on horticultural crops grown	Potted plants,	Practical log book, quiz, test Practical log book, quiz, test

stress on horticultural crops grown under irrigation	irrigation		irrigation	under irrigation		
GENERAL OBJECTIVE 7.0: Understand the concept of irrigation water management						
THEORETICAL CONTENT			PRACTICAL CONTENT			
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
7.1 Discuss management of poor quality irrigation water	Explain poor quality irrigation water and its management	White board, marker, projector, charts etc	Identify poor quality irrigation water	Guide students to identify poor quality irrigation water	Suitable sites, laboratory, water samples, etc.	Practical log book, quiz, test
7.2 Explain the strategies for reducing water use in horticultural crops production. eg	Discuss different strategies for reducing water use in Horticultural crops production.	White board, marker, projector, charts etc	Identify different Strategies for reducing water use in horticultural crops production.	Guide the students to identify different strategies for reducing water use in horticultural crops production.	School farm, orchard other farms.	Practical log books, quiz, test Examination

improving uniformity of water distribution, maximizing water application efficiency, mulching, pruning, pollarding etc						
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PROGRAMME: **Agricultural and Bio Environmental Engineering Technology: National Diploma**

COURSE: **ABE 112 Tractor Operation and Maintenance**

DURATION: **60 HOURS (1 hour theory plus 3 hours practical per week)**

CREDIT: **4 Units**

GOAL: **This course is designed to provide the students with skill in the operation and maintenance of farm tractors and implements**

GENERAL OBJECTIVES:

On completion of this course; the student should be able to:-

- 1.0 Understand road traffic laws and regulations.**
- 2.0 Identify major tractor parts**
- 3.0 Carry out routine checks on the tractor**
- 4.0 Drive a tractor.**
- 5.0 Use the tractor P.T.O.**

	General Objective: 1.0 Understand road traffic laws and regulations.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	1.1 Recognise the Nigerian and International highway codes.	Display both highway codes and explain them to students	Drawings , picture or slides of the highway codes	To be able to accord meanings to the highway codes.	Group the students to produce some highway codes using cardboards and paints.	Cardboards and paints.
	1.2 Be able to identify road signs and signals (danger or warning)	Display road signs and signals. Explain them	Drawings, picture or slides of road signs and signals.	To recognize road signs and signals and their meanings.	Draw the road signs and signals and explain their meanings	Cardboards and paints.
	1.3 Identify road markings.	List the major road markings and explain them	Sketches, drawings, picture or slides of the road markings.	Students should be able to identify and interpret major road markings.	Take a road walk and identify the road markings.	Major roads with good road markings.
	General Objective: 2.0 Know major tractor parts					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources

2	2.1 Recognise the names of the major parts concerned with tractor driving (steering, starting button, gear levers, clutch pedals, and brakes.).	Define the major tractor parts and ask students to list the parts concerned with tractor driving.	Chalk or magic board, pictures, slides of major parts concerned with tractor driving.	Students should be able to identify and list some of the major parts of the tractor that are associated with driving.	Using a tractor show the major part concerned with tractor driving.	Tractor
	General Objective: 3.0 Carry out routine checks on the tractor					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
3	3.1 Appreciate the need for routine daily checks on the tractor. (Oil level, water level, fuel level, tyre pressure, battery).	List the daily routine checks on the tractor. Explain how to carry out each check.	Chalk or magic board, pictures, slides of operations for daily routine checks in tractors.	Students should understand all daily checks required, as specified within the operators manual, and be able to carry them out correctly.	Demonstrate on the tractor how the daily checks are to be carried out and supervise students to carry out checks.	Tractor or tractor model. Tractor operators manual
4	3.2. Understand periodic servicing requirements of a tractor, as specified within the servicing manual.	Explain the need for periodic servicing.	Chalk or magic board, tractor operators manual, service record book.	Student should be able to interpret tractor service records and explain their importance	Show how to use and interpret tractor service manual, service record book and a log book.	Service manual, service record book and a log book.

4	3.3 Understand the need for effective tractor service records	Explain the importance of maintaining accurate service records and show how to enter service information in the service and log books.	Service manual, service record book and a log book.	Students should be able to accurately enter servicing data into the logbook.	Demonstrate the method of entering of data into the log book and ask students to complete their own record books.	Tractor Logbook.
	General Objective: 4.0 Know how to drive a tractor					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
5	4.1 Understand the procedure for starting diesel and petrol engines.	Introduce the topic. Explain the difference between diesel and petrol engines. State the procedure of starting any of the	Drawings of tractor engine or picture of engine.	Understand the process of starting both petrol and diesel engines.	Demonstrate the differences between starting petrol and diesel engines.	Tractor engine on test ground.

		engines.				
	4.2 Understand the correct procedure for starting and stopping a tractor engine.	Explain the process of starting and stopping the engine.	Drawings of tractor engine or picture of engine.	Be able to correctly start and stop a tractor engine.	Demonstrate correct starting and stopping procedure and supervise students to carry out the task.	Tractor engine on test ground.
6	4.3 Understand correct procedures for driving forwards and backwards	Explain each process of engaging the clutch, selecting forward and reverse gears	Pictorial charts of transmission system.	Students will be able to select appropriate gears and to drive correctly in forward and reverse directions.	Demonstrate correct gear selection and supervise students to drive in forward and reverse directions.	Functional tractor and sufficient space for test driving purposes.
	4.4 Understand correct procedures for right hand and left hand turning.	Give instructions on how to make right hand and left hand turns.	Use student or self to demonstrate.	To be able to correctly signal for left and right hand turning.	Demonstrate how to correctly signal for turns and supervise students whilst carry out the task.	Functional tractor and appropriate roadways for practicing turns.
7	4.5 Understand correct procedures for driving on the public	Explain how to drive on the highway and the	Students or self to demonstrate	Be able to correctly drive on the highway and read road signs while driving.	Drive with students to observe road signs and note them	Functional tractor and appropriate highway for

	highway.	importance of observing other road traffic.				driving.
8	4.6 Identify the 3-point linkage system on a tractor.	Highlight the main components of the three point linkage system of the tractor.	Tractor model, drawings or pictures	Students should be able to recognize the components of the three point linkage system and how to correctly attach an implement.	Show the three point linkage system of the tractor.	Functional tractor
	4.7 Understand how to safely couple a mounted implement to the tractor linkages.	Highlight the process of safely and correctly mounting an implement.	Tractor model, drawings or pictures.	Students should be able to correctly and safely attach an implement to the three-point linkage.	Demonstrate correct mounting of an implement and supervise students to carry out the task.	Functional tractor and suitable mounted implement.
9	4.8 Understand how to raise and lower the mounted implement using the hydraulic lever.	Explain how to use the hydraulic lever to raise and lower implements.	Manuals or catalogues	Students should be able to identify correct controls for raising and lowering the implement.	Demonstrate raising and lowering of implements.	Functional tractor with attached mounted implement
	4.9 Understand how to drive the tractor with mounted implement on test ground.	Explain driving the tractor with mounted implement.	Manuals, catalogues or models	Students should be able to drive the tractor fitted with a mounted implement.	Demonstrate driving a tractor with mounted implement on test ground and supervise students carrying out the task.	Functional tractor with mounted implements

	4.10 Understand how to lower and dismount the implement.	Explain the process of lowering and dismounting the implement.	Manuals, catalogues or models	Students should be able to safely dismount implements from three point linkages.	Demonstrate correct dismounting procedure and supervise students to carry out the task.	Functional tractor with a range of mounted implements
10	4.11 Understand how to couple a trailed implement to a tractor.	Explain the process of coupling trailed implement.	Manuals, catalogues or models	Students should be able to correctly To understand the techniques in of coupling a trailed implement.	Demonstrate how to couple a trailed implement and supervise students to carry out the task.	Tractor and trailer.
	4.12 Understand driving techniques of tractor with trailed implement.	Explain the techniques of driving a tractor and trailed implement in both forward and reverse directions.	Chalkboard, Manuals, catalogues or models	Students should be able to drive a tractor and trailed implement in both forward and reverse directions.	Demonstrate correct forward and reversing procedures for tractor and trailed implement	Tractor and trailed
	4.13 Understand how to turn sharp corners with a trailed implement	Explain how to carry out turning and how to estimate the point to start the turn.	Chalkboard, Manuals, catalogues or models	Students should be able to accurately turn sharp corners with a tractor and trailed implement.	Demonstrate correct turning sequences and supervise students in carrying out the task	Tractor and trailed Suitable obstacle course for practicing.

11	4.14 To prepare for a tractor driving test.	Explain the requirements for a tractor driving test	Magic or chalk board.	Students should be prepared for a tractor driving test	Explain the requirements for a tractor driving test and supervise the students whilst practicing.	Tractor and suitable test site for practicing.
12	4.15 To practice requirements for a tractor driving test.	Revise requirements for a tractor driving test	Magic or chalk board.	Students should be prepared for a tractor driving test	Supervise the students whilst practicing.	Tractor and suitable test site for practicing.
	4.16 To undergo a tractor driving test.	Arrange for driving test	Tractor	To acquire driving license for a tractor operator's grade.	Arrange for driving test.	Tractor
	General Objective: 5.0 Understand the use of the p.t.o. of a tractor.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
13	5.1 Explain the need for the p.t.o. of a tractor.	Introduce topic Give the full meaning of pto (power take off). Explain the position of the pto and area of	Tractor model, drawings or pictures	Recognise the main functional components of the tractor pto	Locate and show the position of pto.	Tractor

		applications.				
	5.2 State the precautions for the safe use of the tractor p.t.o.	List the precautions for the safe use of the tractor p.t.o.	Magic or chalk board	Understand the safety precautions required for the use of the pto.	Demonstrate the main safety aspects and procedures for using the tractor pto.	Tractor PTO components, guards, etc
	5.3 Identify the universal joint used with the p.t.o. of a tractor.	Mention and display the universal joint used with the pto.	Magic or chalk board	To understand the working principles of the universal joint.	Show the universal joint and demonstrate its use within the pto.	Tractor Implement PTO shaft Universal joints
14	5.4 To understand correct procedures for coupling a machine to the p.t.o. of a tractor	Explain the process of coupling machine to tractors pto	Tractor model, drawings or pictures	To be able to correctly couple a pto-driven implement, such as a rotary slasher, to the tractor	Demonstrate the process of coupling a rotary slasher or other pto driven machine to the pto and supervise students in carrying out the operation.	Tractor and pto-driven machine: e.g. rotary slasher.
15	5.7 Understand correct operation of a mounted p.t.o. driven machine.	Explain correct operation of a mounted pto driven machine	Magic or chalk board	To be able to safely operate a mounted pto driven machine.	Demonstrate operating a mounted pto driven machine and supervise	Tractor and machine. Appropriate land area for

					students in carrying out the operation.	practicing
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TYPE OF ASSESSMENT	PURPOSE AND NATURE OF ASSESSMENT	WEIGHTING (%)
Examination	Final Examination (written) to assess knowledge and understanding	50%
Work books	Workbook of activities completed throughout course	20%
Practical activities	Assessment of practical skills and abilities in operating tractor and implements	30%
TOTAL		100

PROGRAMME: National Diploma in Irrigation Agronomy Technology

COURSE: IAT 125–Irrigation Practice I.

DURATION: (2 Hours Lectures, 1 Hour Practical)

UNITS: 3.0

GOAL: This course is designed to equip the students with basic skills of irrigation Water Harvesting.

GENERAL OBJECTIVES:

On completion of this module, the student should be able to:

- 1.0 Understand the concept of irrigation water harvesting.**
- 2.0 Understand the principles of Irrigation water harvesting**
- 3.0 Understand water harvesting and storage techniques.**
- 4.0 Understand water harvesting Structures.**
- 5.0 Understand different types of water harvesting structures.**
- 6.0 Understand irrigation pumps and their characteristics.**

	PROGRAMME: NATIONAL DIPLOMA IN IRRIGATION AGRONOMY TECHNOLOGY
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COURSE: IRRIGATION PRACTICES I		COURSE CODE: IAT 125			CONTACT HOURS: (2 hours lecture: 1 hours practical)	
	Goal: This course is designed to equip the students with basic skills of irrigation Harvesting.					
	General Objective: On completion of this module, the student should be able to: 1.0 Understand the concept of irrigation water harvesting techniques. 2.0 Understand the principles of Irrigation water harvesting techniques 3.0 Understand water harvesting and storage techniques. 4.0 Understand water harvesting Structures. 5.0 Understand different types of water harvesting structures. 6.0 Understand irrigation pumps and their characteristics.					
	General Objective: 1.0 Understand the concept of irrigation water harvesting techniques.					
COURSE SPECIFICATION: Theoretical Contents:				Practical Contents:		
Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources	Evaluation
1.1 Define of irrigation Water harvesting 1.2 Discuss the prospects and potential of irrigation water harvesting in	Define irrigation water harvesting. Highlight the prospects and potential of irrigation water harvesting in Nigeria	LCD projector, slide projector, white board, markers. LCD projector, slide projector, white				Test assignments, examinations

Nigeria		board, markers.				
1.3Differentiate between irrigation water harvesting and water harvesting for other purposes.	Distinguish between irrigation water harvesting and water harvesting for other purposes.	LCD projector, slide projector, white board, markers.				
1.4Discuss the irrigation water harvesting as a solution to drought problems as a results of climate change.	Explain irrigation water harvesting as a solution to drought problems as a results of climate change.	LCD projector, slide projector, white board, markers.				
General Objective 2.0Understand the principles of Irrigation water harvesting techniques						
Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources	
2.1. Explain the reasons for water harvesting techniques.	Discuss the reasons for water harvesting.					

2.2. Explain the factors influencing the choice of water harvesting techniques.E.g rain fall intensity, slope, etc.	State the factors influencing the choice of water harvesting techniques as in 2.2.					
2.3 Discuss the limitations of each of the water harvesting techniques	Enumerate the limitations of each of the water harvesting techniques					
	General Objective 3.0 Understand water harvesting and storage techniques					
Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources	
3.1 Discuss the different methods of irrigation water harvesting.E.g roof harvesting, run-off, check dams, sand	Explain the different methods of irrigation water harvesting as in 3.1	LCD projector, slide projector, white board, markers.	Identify sites for irrigation water harvesting.	Accompany students to water harvesting sites to show them how water is harvested.	Sites	

dams, etc 3.2 Discuss the different methods of irrigation water storage.E.gbarrage, ponds, dams, etc 3.3Discuss the components of irrigation water harvesting systems (catchment, streams or channels, filters etc.) 3.4 List the problems associated with losses of irrigation water due to storage. (seepage, evaporation percolation and other leakages) 3.5 ExplainLong-term benefits of irrigation water	Explain the different methods of irrigation water storage as in 3.2. Explain the components of irrigation water harvesting systems (catchment, streams or channels, filters etc.) Outline the water losses due to storage (seepage, evaporation percolation and other leakages) DiscussLong-term benefits of irrigation water harvesting as in	LCD projector, slide projector, white board, markers. LCD projector, slide projector, white board, markers. LCD projector, slide projector, white	Identify sites for irrigation water storage..	Accompany students to water storage sites to show them howharvested water is stored.	Sites	
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harvesting. E.g erosion control, flood control, ground water recharge, food security, job creation, etc.	3.5:	board, markers.					
General Objective 4.0 Understand water harvesting Structures.							
Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources		
4.1 Estimate the quantity of water to be harvested based on the catchment characteristics (rainfall	Explain how to estimate the quantity of water to be harvested based on the catchment characteristics as in 4.1	LCD projector, slide projector, white board, markers.	Determine the quantity of water to be harvested based on catchmentcharacter	Guide students to determine the quantity of water to be harvested from a small catchment area.	Meteorologic al station Survey equipment		

intensity/duration, size of the catchment area, topography,etc.)			istics.			
4.2 Select the appropriate storage structures for the harvested irrigation water as in 4.1 above.	Explain how to select the appropriate storage structures for the harvested irrigation water as in 4.1 above.	LCD projector, slide projector, white board, markers.				
General Objective 5.0 Understand different types of water harvesting structures.						
Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources	
4.1 Understand the different types of water harvesting structures	Explain the Rooftop, Country Road, Threshing Yard, and Other Earthen Surfaces.	LCDprojector, slide projector, white board, markers.	. Understand the different types of water harvesting structures such as Rooftop, Country Road, Threshing Yard, and Other	Show students the different structures in the field	Existing structures	

4.2 Understand the purpose and economic importance of selecting different irrigation water harvesting structures	Explain in details the economic importance of selecting different irrigation water harvesting structures	LCDprojector, slide projector, white board, markers.	Earthen Surfaces. Compare the cost of constructing the earth and the concrete reservoirs			
4.3 Identify the components of each irrigation water harvesting structure	Catchment structures, conveyance, gutter, filters, storage tanks etc.	LCD projector, slide projector, white board, markers.	Know different components of the structures			
General Objective 6.0: Understand irrigation pumps and their characteristics.						
Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources	

6.3 Identify the different features of centrifugal pumps		Pump LCD projector, slide projector, white board, and markers.	Identify the different features of centrifugal pumps	Guide students in the workshop to identify different features of centrifugal pumps.	Different pumps	
6.4 Illustrate graphically, the term 'pump characteristics' in relation to speed, head, discharge and horsepower of a pump.	Explain graphically, the term 'pump characteristics' in relation to speed, head, discharge and horsepower of a pump.	Pump, pump characteristics curves, LCD projector, slide projector, white board, markers.				

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PROGRAMME: National Diploma in Agricultural Technology

COURSE: AGT 121 - Annual Crops

DURATION: 45 Hours (2 Hours Lectures, 1 Hour Practical)

UNITS: 3.0

GOAL: This course is designed to acquaint students with the agronomy and agro-techniques of different types of annual crops.

GENERAL OBJECTIVES:

On completion of this course the student should be able to:

- 1.0 Understand the general classification, identification and botany of important annual crops.
- 2.0 Understand the origin and geographical distribution of annual crops.
- 3.0 Understand the factors affecting crop production.
- 4.0 Understand the management of annual crops after planting.
- 5.0 Understand weeds, insect pests and diseases of annual crops.
- 6.0 Understand the harvesting procedures of annual crops.
- 7.0 Understand the handling, processing and storage of harvested annual crops.
- 8.0 Understand pasture and forage agronomy.

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: ANNUAL CROPS	COURSE CODE: AGT 121	CONTACT HOURS: 45 HOURS (2 hrs lectures: 1 hr practical)
GOAL: This course is designed to acquaint students with the agronomy and agro-techniques of different types of annual crops.		
COURSE SPECIFICATION:		

	General Objective: 1.0 Understand the general classification, identification and botany of important annual crops.			Practical Contents:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	1.1 Understand the difference between an annual crop and a tree crop. 1.2 Identify some annual crops like maize, rice, cowpea, groundnut, cassava, yam, potato, sorghum and millet, soyabean, wheat etc. 1.3 Understand the basis for the agricultural classification of crops 1.4 Classify agricultural crops into - cultivated plants; - wild plants. 1.5 Classify plants according to duration of growth: - annuals - biennials - perennials 1.6 Classify crops based on mode of production - Field cash crops - Forage crops - Horticultural crops - Plantation crops. 1.7 Classify crops on the basis of use.	Explain the term annual crop and differentiate it from other crops. Classify and explain the basis for classifying crops.	LCD projector, white board, markers, laptop computers.	Identify annual crops botanically based on structure and forms	Guide students to identify annual crops based on structure and forms.	Seeds, fruits, seedlings and fully grown annual plants

2	- cereals (rice, sorghum, maize, millet etc) - grain legumes (cowpea, soyabeans, groundnuts) - root and tuber crops (cassava, sweet potato) - sugar crops (sugar cane) - fibre crops (hemp, kenaf) - vegetable (spinach, water leaves). 1.8 Understand the botany of each crop under 1.7 above. 1.9 Know the botanical names of the crops in 1.7 above. 1.10 Recognise the structure and forms of the crops in 1.7 above. 1.11 Identify seed, seedling, fruits, storage organs and other essential parts of the major annual crops in 1.7 above.	Explain the botany, structure and forms of annual crops and their botanical names.	LCD projector, white board, markers, laptop computers.	Identify the various annual crops. Identify various crops based on their culture, growth period, production, and uses.	Guide students to identify some annual crops.	Seeds, fruits, seedlings and fully grown annual plants.
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	General Objective: 2.0 Understand the origin and geographical distribution of annual crops.			Practical Contents:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
3	2.1 Know of the origin and geographical distribution of annual crops listed in 1.7 above.	List and explain the various ecologies and how crops are distributed across ecologies.	LCD projector, white board, markers, laptop computers.	See crops growing in different geographical/ecological areas of the country.	Accompany students on field trip.	Suitable visit venues.
4	2.2 Identify varieties/cultivars of different annual crops using major characteristic physical features both in the field and the store.	Explain the characteristic features of the varieties/cultivars of major annual crops both while growing and in the store.	LCD projector, white board, markers, laptop computers.	Identify the major characteristic features of the varieties of annual crops.	Guide students to identify major varietal features of annual crops	College farm, seeds, seedlings and fully grown crops

	General Objective: 3.0 Understand the factors affecting crop production.			Practical Contents:		

WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
5	3.1 Understand the effect of the following factors on crop production:- i. Environmental; ii. Economic; iii. Sociological. 3.2 Understand the ecological requirements of common annual crops under the headings:- i. Temperature; ii. Rainfall; iii. Soil or Edaphic factors. 3.3 Know about annual crop adaptation to: i. Soil pH; ii. Soil type; iii. Soil moisture regime. 3.4 Understand the principles of crop production under:- i. Site selection;	List and explain the environmental, economical and sociological factors on annual crop production List and explain the ecological requirements of annual crops Explain the effects of soil pH, soil type and soil moisture regime on crop adaptation	LCD projector, white board, markers, laptop computers	Identify the effects of	Guide students	Soil and water

6	ii. Land preparation; iii. Seed selection/treatment; iv. Spacing. 3.5 Understand the following terms:- Planting rate, seed rate and population. 3.6 Carry out the following activities in the farm:- Seed beds preparation; fertilizer applications; mulching; watering; spraying insecticides. 3.7 Cultivate and maintain some annual crops like maize, cowpea, yams, cassava, tomatoes, pepper, vegetables etc.	List and explain the principles of crop production as in 3.4i-iv Explain the terms in 3.5	LCD projector, white board, markers, laptop computers	soil pH, soil type and moisture regime on annual crops, display pH meter, tensiometer. Identify suitable land for annual crop production Identify optimum cultural practices for annual crop production	to determine soil pH, soil type and soil moisture Accompany on field trip. Demonstrate optimum cultural practices for annual crop	laboratory Suitable visit venues. College farm
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7					production. Guide students to cultivate some major annual crops.	
	General Objective: 4.0 Understand the management of crops after planting.			Practical Contents:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
8	4.1 Have a detailed knowledge of the following types of crop management practices:- thinning, supplying, fertilizer application, weeding and disease and pest control. 4.2 Identify appropriate timing for operations in 4.1 above.	List and explain the various crop management practices as listed in 4.1	LCD projector, white board, markers, laptop computers	Identify the optimum management practices for some annual crops	Guide students to carry out the various management practices for some annual crops	Seeds, fertilizers, hoes, land

	General Objective: 5.0 Understand weeds/and insect pests and diseases of annual crops.			Practical Contents:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
9	5.1 Identify main weeds that retard growth of annual crops. 5.2 Identify main insect pests of annual crops. 5.3 Identify main diseases on annual crops. 5.4 Know the source of some	List and describe the major weeds, pests and diseases of the various annual crops.	LCD projector, white board, markers, laptop computers.	Identify major weeds, pests and diseases of major annual crops.	Guide students to identify major weeds, pests and diseases of annual crops.	Field annual crops.

10	weeds on crop farms.					
	5.5 Be aware of the life cycle of the most common annual crop weeds, pests and diseases. 5.6 Understand their overall economic significance. 5.7 Have a basic knowledge of the damage caused by weeds, pests and diseases of annual crops. 5.8 Have a general knowledge of methods of controlling weeds, pest attacks, and bacterial and fungal diseases on annual crops in the farm.	Explain the life cycle, symptoms and economic importance of common weeds, pests and diseases of major annual crops. Explain control methods.	LCD projector, white board, markers, laptop computers. LCD projector,	See damage caused by weeds, pests and diseases in the field. See crop protection methods being	Demonstrate damage to crops. Demonstrate crop	Field annual crops.

11			white board, markers, laptop computers.	demonstrated.	protection methods.	Field annual crops. Spray equipment, agrochemicals, implements.
	General Objective: 6.0. Know the harvesting procedures of annual crops.			Practical Contents:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
12	6.1 List and remember types of crop harvesting methods, both manually and using modern equipment. 6.2 Understand the criteria for determining time of harvesting of various annual crops. 6.3 Harvest major annual crops physically from the field.	List and explain types of crop harvesting techniques; explain effects of timely harvesting.	LCD projector, white board, markers, laptop computers.	Identify efficient harvesting methods	Guide students to identify various harvesting equipment Guide students to harvest planted crops.	Crops and equipment/tools /machinery.

WEEK	General Objective: 7.0 Understand the handling, processing and storage of harvested annual crops.			Practical Contents:		
13	7.1 Understand the general processes for handling of various harvested annual crops in the field – manually and using modern equipment. 7.2 Understand the different methods of manual and mechanical crop processing e.g. destalking, threshing, sorting, grading decorticating etc. 7.3 Understand the use of major processing machines e.g. shellers, dryers, cassava fryers etc. 7.4 Know about the end product of the processing of grains, tubers, legumes, spices etc. 7.5 Process harvested product into consumable products e.g. processing of cassava into gari. 7.6 Understand the methods of storage of field processed	List and explain methods and tools/equipment for field handling and processing of harvested annual crops List and explain the use of some major processing machines/tools Explain some end-products of processed annual crops as in 7.4	LCD projector, white board, markers, laptop computers. LCD projector, white board,	Identify major processing tools/equipment Understand how	Demonstrate how the tools/equipment operates Guide students to operate the tools/machines Demonstrate processing of some annual	Processing tools/machines,

14	products. 7.7 Understand the methods of storing planting materials.	List and explain storage options for field processed annual crops and planting materials	markers, laptop computers	to process annual crops in practice.	crops. Guide students to process some annual crops e.g. cassava	Harvested products, tools/equipment
Week	General Objective: 8.0. Understand pasture and forage agronomy.			Practical Contents:		
15	8.1 Appreciate the scope of pasture and forage agronomy including grasses, legumes, their distribution, improvement, quality and assessment,	Explain the scope of the agronomy of pasture and forage crops as indicated in 8.1	LCD projector, white board, markers, laptop computers			

	establishment and conversation. 8.2 Identify major pastures, grasses and legumes within the vicinity. 8.3 Establish crop type collection/field laboratory/forage bank for growing crops on a permanent basis.	List and explain the major pasture and forage crops within the college area		Identify major pasture and forage crops within the locality	Guide students to collect and identify various pasture and forage crops	College and private farms
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PROGRAMME: National Diploma in Agricultural Technology

COURSE: **AGT 122 - Crop Protection**

DURATION: **45 Hours (2 Hours Lectures, 1 Hour Practical)**

UNITS: **3.0**

GOAL: **This course is designed to provide the students with the basic knowledge of crop diseases and pests, and information on their methods of control.**

General Objectives:

On completion of this course, the student should be able to:

1.0 Understand the general principles of crop protection.

2.0 Identify plant diseases and understand methods of control.

3.0 Identify insect pests of crops and understand methods of control.

4.0 Identify weeds and understand methods of control.

5.0 Identify nematode pests of crops and understand methods of control.

6.0 Identify vertebrate pests of crops and understand methods of control.

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE: CROP PROTECTION	COURSE CODE: AGT 122	CONTACT HOURS: (2 hour lectures: 1 hours practical)
GOAL: The course is designed to provide the students with the basic knowledge of crop diseases and pests, and information on their methods of control.		
COURSE SPECIFICATION: Theoretical Contents:		Practical Contents:
	General Objective: 1.0 Understand the general principles of crop protection.	

WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	1.1 Appreciate the importance of crop protection in agriculture. 1.2 List various crop protection methods: - cultural - Biological - Chemical - Mechanical - Quarantine 1.3 Understand integrated pest management.	Discuss basis for crop protection Explain the various crop protection methods. Define the concept of integrated pest management.	LCD Projector, slide projector, white board, markers, laptop computers. LCD Projector, slide projector, white board, markers, laptop computers.			
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	General Objective: 2.0 Identify plant diseases and understand methods of control.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
3	2.1 Understand the definition of the term 'disease' in relation to crops. 2.2 Know the common diseases of annual and tree crops in Nigeria. 2.3 Know diseases caused by : a) fungi,	Discuss disease in relation to crops. Describe the pathogens and their plant hosts. Describe the plant	LCD Projector, slide projector, white board, markers, laptop computers, pictures of diseased plants	Identify common crop diseases. Identify different	Guide students in the identification of crop diseases.	Diseased plants, Microscopes, Magnifying Lens, school and private farms. Plant disease

WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
6	3.1 Be aware of the characteristic features of a typical insect. 3.2 Understand the life cycle of insects (complete and incomplete) and metamorphosis.	. Explain the characteristic features of a typical insect. Draw different life cycles of some insects. Explain the various mouth parts in insects.	LCD Projector, slide projector, white board, markers, laptop computers, pictures of insects.	Identify different species of insect pests Draw some species of insects. Identify insect pest (insect album).	Guide the student to identify insect pests. Guide students to develop an insect box.	Specimen of different life stages of insects. Various specimens of insect pests. Samples of different pesticides.
7	3.3 Learn the nature of damage caused by insect pests to plants: - Biting and chewing. - Sucking and piercing.	Discuss the nature and the part of plants that are damaged by insect pests.		Collect plant parts damaged by pest. Identify plant parts damaged by pests.	Guide students.	Various plant specimens with pest damages.

8	- Boring - Cutting. 3.4 Recognize common crop pests and the plants they damage. 3.5 Understand the methods of controlling insects with emphasis on – - cultural - Biological - Chemical - Quarantine - Integrated. 3.6 Have a basic understanding of the mode of action of chemical control,	Discuss various methods of insect pests control with emphasis on integrated pest management. Discuss contact and systemic mode of action by pesticide. Enumerate the		Carry out pest control using pesticides. Carry out mixing of pesticide by diluting with water.	Guide students.	Pesticides measuring equipment, Water, Knapsacks.
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	both contact and systemic. 3.7 Know details of the procedure and safety precautions used in chemical control of pests.	advantages of IPM. Explain pesticide safe use and precaution				
	General Objective: 4.0 Identify weeds and understand methods of control.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
9	4.1 Understand weeds in relation to crop production 4.2 Classify weeds into growth habit, life cycle and habitat etc. 4.3 Understand the effects of weeds on crop plants. 4.4 Have a detailed	Discuss weeds as they relate to crop production. Explain classification of weeds and the basis for classification.	LCD Projector, slide projector, white board, markers, laptop computers, pictures of insects.	Identify common weeds of crops. Differentiate between different weed types.	Assist students to identify common weeds. Guide students to do weed album.	Various types of weeds.

10	knowledge of cultural, biological, chemical and integrated methods of weed control. 4.5 Know about the methods of application of herbicides. 4.6 Have a basic understanding of the modes of action of herbicides. 4.7 Understand factors affecting effectiveness of herbicides – - herbicide rate and concentration 4.8 Know how to take precautionary measures in herbicide use.	Explain cultural biological, chemical and integrated weed control methods. Classify different herbicides and explain different methods of herbicide application and their selectivity.		Carry out different methods of herbicide application. Distinguish herbicides based on mode of action. Identify different	Guide students apply herbicides to control weeds. Use herbicides containers to identify different herbicides.	Fields and spraying equipment. Containers and labels.
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		Discuss hazards associated with the use of herbicides and how to prevent them.		factors affecting herbicides effectiveness		
	General Objective. 5.0 Identify nematode pests of crops and understand methods of control					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
12	5.1 Learn a definition of nematodes. 5.2 List common nematodes pest	Explain nematode as an invertebrate, their mode of infection, symptoms, and	LCD Projector, slide projector, white board, markers, laptop	Examine soil nematodes	Guide students to extract nematodes and examine them under the	Soil with high organic content. Microscope, hand

13	affecting crops. 5.3 Understand modes of infection, symptoms and damages caused by nematodes. 5.4 Understand methods of nematode control.	damages caused by them. Describe methods of control.	computers, pictures of insects.	under the microscope. Identify typical nematodes in yam, tomatoes and beans. Practice control methods.	microscope. Demonstrate control methods.	lens. Collection of plants infected with nematode e.g. yam, tomato, bean, etc. Fields and equipment.
	General Objectives: 6.0 Identify vertebrate pests of crops and understand methods of control.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
14	6.1 Know common crop vertebrate pests such as rodents,	Discuss vertebrae pests of crops and the nature of damage	LCD Projector, slide projector, white board, markers, laptop	Identify a selection of vertebrate pests.	Guide the students to	Specimen of vertebrate pests e.g. rodents, birds

15	birds, monkey etc. 6.2 Know crops in which vertebrate pests listed in 6.1 are a major problem. 6.3 Understand the nature of damage caused by vertebrate pests. 6.4 Know the methods of controlling vertebrate pests.	they cause. Identify crops in which vertebrate pests are major problems. Explain the methods of controlling vertebrate pests such as traps, baits etc.	computers, pictures of insects.	Identify some control tools such as traps and baits.	collect and identify some vertebrate pests Guide students identify and make traps.	etc. Drawing or picture of monkey. Materials and tools.
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PROGRAMME: National Diploma in Agricultural Technology

COURSE: AGT 127 - Principles of Irrigation and Drainage.

DURATION: (2 Hours Lectures, 1 Hours Practical)

UNITS: 3.0

GOAL: This course is designed to equip the students with basic skills of irrigation and drainage.

GENERAL OBJECTIVES: On completion of this module, the student should be able to:

- 1.0 Understand the concept of irrigation and drainage.
- 2.0 Understand water requirements of crops.
- 3.0 Identify and understand and sources of irrigation water.
- 3.0 Understand effects of water stress on crop growth.
- 4.0 Identify and understand irrigation structures and pumps.
- 5.0 Understand irrigation water application methods and scheduling.
- 6.0 Understand principles of drainage.
- 7.0 Understand the principles of water conservation and supply

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE: PRINCIPLES OF IRRIGATION AND DRAINAGE.		COURSE CODE: AGT 127		CONTACT HOURS: (2 hours lecture: 1 hours practical)		
Goal: This course is designed to equip the students with basic skills of irrigation and drainage.						
COURSE SPECIFICATION: Theoretical Contents:				Practical Contents:		
	General Objective: 1.0 Understand the concept of irrigation and drainage					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	1.1 Know about prospects and potential of irrigation in Nigeria	Highlight importance and potential of irrigation in Nigeria.	LCD projector, slide projector, white board, markers.	See examples of irrigation and drainage schemes.	Show examples of irrigation and drainage schemes.	Suitable visit venues.
2	1.2 Learn the definition of irrigation. 1.3 Appreciate the difference between	Define irrigation. Discuss irrigation				

	irrigation and drainage. 1.4 Understand the problems associated with irrigation and drainage	problems.				
	General Objective 2.0 To understand water requirements of crops.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
3	2.1 Know the uses of water in plants Understand the different forms of soil moisture e.g. gravitational water, capillary water and hygroscopic water. Understand the concept of available water, field capacity and permanent wilting	Explain the uses of water and discuss the different forms of soil water and their importance to crop production.	LCD projector, slide projector, white board, markers.	See how water is held in soil.	Show how water is held in soil.	Soil samples, water.

4	point etc. 2.2 Know about the water requirements of crops. 2.3 Estimate irrigation water requirements e.g. the consumptive use of water. 2.4 List the factors that determine water quality. 2.5 Classify irrigation waters according to their qualities, 2.6 Understand the mechanisms and importance of evapotranspiration	Explain water requirements of crops Explain how to estimate total water requirement. Explain concept of available water. Describe water quality parameters. Define evapotranspiration and its importance.		Calculate the determination of water requirements of crops.	Guide the student how to determine water requirement of crop.	Lysimeters, Pan evaporimeter, meteorological station.
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	General Objective 3.0 Identify and understand sources of irrigation water.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
5	3.1 Understand sources of water for irrigation. 3.2 State the forms in which ground water exists.	Outline sources of irrigation water. - Rivers - Stream. - Lakes - Ground water - Domestic water	LCD projector, slide projector, white board, markers.	Identify sources of irrigation water.	Take students on excursion to nearby dams, rivers, streams and lakes where irrigation activities take place.	Suitable visit venues.
6	3.3 Estimate ground water yield. 3.4 Compute discharge from wells.	Explain 'yield' and 'discharge'		Estimate ground water yield.	Demonstrate the yield of ground water from tube wells and bore holes.	Water meters and flumes

	General Objective 4.0 Understand effects of water stress on crop growth.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
7	4.1 Understand the concept of water stress. 4.2 Be aware of the effects of water stress on crops. 4.3 Know the beneficial effects of water stress to crops.	Explain and define water stress. Explain the various effects of water stress on plant functions and processes e.g photosynthesis, respiration, growth, carbohydrate metabolism, protein metabolisms, hormonal balance, etc.	LCD projector, slide projector, white board, markers.	Observe the effect of water stress on the appearance of crops. .	Show students how to grow crops and stress them by not applying water and observe the effects on physical appearance.	- seeds - plastic pots - watering cans.

	General Objective 5.0 Identify and understand irrigation structures and pumps.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
8	5.1 Know about irrigation water conveyance systems and measuring devices with their component parts. 5.2 Understand irrigation structures and water control structures such as off takes, cross drainage works, siphons, lining of canals. 5.3 Identify types of	Describe and explain major structures in irrigation schemes.	LCD projector, slide projector, white board, markers.	See structures used in irrigation on field trip.	Accompany students.	Suitable visit venues.

9	irrigation pumps 5.4 State criteria for pump selection. 5.5 Understand the working principles of selected pumps.	Describe the different pumps used in irrigation Explain and discuss the criteria for pump selection.		Maintain irrigation pump	Demonstrate the servicing of irrigation pumps. Show the students different pumps used in irrigation.	Different pumps
	General Objective 6.0 Understand irrigation water application methods and scheduling.					
WEEK	Specific Learning	Teachers Activities	Learning	Specific Learning	Teachers Activities	Learning

	Objective		Resources	Objective		Resources
10	6.1 Describe different water application methods in irrigation e.g. surface irrigation, sub-surface irrigation, sprinkler irrigation and drip system. 6.2. Understand the factors that determine choice of irrigation methods. 6.3 Know how to schedule irrigation to make optimum use of water.	Explain crop water application systems. Describe the Factors influencing the choice of irrigation methods.	LCD projector, slide projector, white board, markers.	Observe irrigation water application methods.	Visit an existing irrigation project. Show the students how to maintain and operate different water application methods. Show students how to schedule irrigation.	Crops field, siphon tubes, irrigation pumps source of water. • Paper, calculators.
11	6.4 Calculate the depth of water application in irrigation.	Describe irrigation Scheduling methods based on crop, climate and soil parameters .		Practice irrigation schedule methods.		

	General Objective 7.0 Understand principles of drainage					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
12	7.1 Understand the definition of drainage 7.2 Understand the difference between surface drainage and tile drainage. 7.3 Know the sources of drainage problems e.g. poor land grading, flood, poor soil structure, high water table, surface runoff, soil compaction. 7.4 Know the methods of carrying out soil drainage e.g. open drains, tile drains, sub-surface methods 7.5 Be aware of the types	Describe drainage problems in agriculture Explain the sources of drainage problems. Explain methods of	LCD projector, slide projector, white board, markers.	Plan the layout of drainage structures.	Guide student to layout drainage structure. Demonstrate soil drainage methods and	- Paper - Hoes - Tractor Drainage

13	and features of drainage structures	carrying out soil drainage e.g. open drains, tile drains, sub-surface methods. Describe types and features of drainage structures.		Carry out soil drainage.	procedure.	equipment, pipes etc.
	General Objective 8.0 Understand the principles of water conservation and supply.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
14	5.1 Understand the importance of water conservation. 5.2 Know the various methods of conserving water on the farm e.g. earth dams. 5.3 Know the various methods of water storage.	Explain the importance of water conservation practice. List and describe the various methods of conserving water on the farm e.g. earth dams ridge-tie water.	LCD projector, slide projector, white board, markers.	Understand water conservation techniques.	Demonstrate the various forms of water conservation techniques.	College farm

15	5.4 Know the uses of water on the farm. 5.5 Understand the process of water supply and development from boreholes, wells and reservoirs and water harvesting structures.	Describe the various methods of farm water storage and explain the uses of water on the farm.		Identify the ways of harnessing water resources.	Guide students to identify different water harvesting techniques. Organize visits to irrigation farms.	College farm Private farms
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PROGRAMME: National Diploma in Agricultural Technology

COURSE: AGT 129 - Industrial Crop Production I

DURATION: 60 Hours (2 Hours Lectures, 2 Hours Practicals)

UNITS: 4.0

GOAL: This course is designed to acquaint students with the agronomy and Agro-techniques of different types of Industrial crops.

GENERAL OBJECTIVES:

On completion of this course the student should be able to:

- 1.0 Identify different types of industrial crops.
- 2.0 Identify areas of production of various industrial crops.
- 3.0 Understand the botany, of important industrial crops.
- 4.0 Understand the production techniques of industrial crops in Nigeria.
- 5.0 Understand the production cycle of major industrial crops in Nigeria.

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: INDUSTRIAL CROP PRODUCTION I			COURSE CODE: AGT 129		CONTACT HOURS: 60 Hours (2 Hrs Lectures: 2 Hrs Practicals)	
GOAL: This course is designed to acquaint students with the agronomy and Agro-techniques of different types of Industrial crops.						
COURSE SPECIFICATION:				Practical Contents:		
	General Objective: 1.0 Identify different types of industrial crops.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	1.1 Identify the following Industrial crops cotton Jatropha, Jute, Kenaf, Sisal,	Describe the crops in 1.1	White board, markers, slide and LCD	Identify the following industrial crops cotton	Guide students to identify the following	Samples of crops and products.

	Sweet Sorghum, Sugar cane, Tobacco etc. 1.2 Understand the origin and history of each crop in 1.1 above. 1.3 Understand their adaptation to Nigerian climatic conditions.	Explain the origin and history of each crop in 1.1. Explain their adaptation to Nigerian climatic conditions.	projectors, laptop computers.	Jatropha, Jute, Kenaf, Sisal, Sweet Sorghum, Sugar cane, Tobacco etc. and their economic products .	industrial crops cotton Jatropha, Jute, Kenaf, Sisal, Sweet Sorghum, Sugar cane, Tobacco etc.	
WEEK	General Objective: 2.0 Identify areas of production of various industrial crops					
2	2.1 Identify producing areas of the various industrial crops. 2.2 Compare figures for: i. main producing areas ii. marginal areas. 2.3 Know the production trends of the main industrial crop producing areas in Nigeria.	Discuss and identify producing areas of the various industrial crops. Discuss and compare figures for: i. main producing areas	White board, markers, slide and LCD projectors, laptop computers.	See commercial crops being grown.	Accompany students.	Suitable visit venues.

		ii. marginal areas.				
WEEK	General Objective: 3.0 Understand the botany of important industrial crops.					
3 and 4	3.1 Understand the botany of each industrial crop listed in 1.1 above under the following heading: i. taxonomy ii. morphology iii. anatomy iv. structural forms of fruits and seeds.	Describe the botany of each industrial crop listed in 1.1 above under the following heading: i. taxonomy ii. morphology iii. anatomy iv. structure and farms of fruits and seeds. List the types of varieties of industrial crops in 1.1 above. Discuss varietal improvement and quality	White board, markers, slide and LCD projectors, laptop computers.	Botany of Industrial crops	Explain practically the botany of each industrial crop	Samples. Hand lenses.
5	3.2 Know the varieties of industrial crops in 1.1 above. Identify improved and			Identify varieties of	Assist students to identify varieties of industrial the	Samples.

	recommended varieties of the crops in 1.1 above.	enhancement.		industrial crops	crops	
WEEK	General Objective: 4.0 Understand and explain the production techniques of industrial crops in Nigeria.					
6	4.1 Understand the following cultivation practices for industrial crop production: i nursery preparation ii. planting date, spacing, iii. use of poly pots in the nursery.	Describe the cultural practices for industrial crops as at 4.1.	White board, markers, slide and LCD projectors, laptop computers.	Watch and carry out cultural practices for industrial crops over 6 weeks to match lecture program.	Show and demonstrate cultural practices for industrial crops over 6 weeks to match lecture program.	College Farms, plants, implements, sprays, relevant machinery.
7	iv. nursery management practices e.g. weeding, shading, watering etc. v. site selection .vi .land preparation vii. Marking- out and planting.					
8	vii .Cultural management practices; ,including. pruning [objectives and methods] principles					

9 10 11 12	of crop protection: ix weed control: x .manuring and fertilizer application. Mulching: xi. Pruning of diseased branches of some industrial crops. 4.2 Carry out spraying of chemicals of different types and rates on different types of diseases and pests of industrial crops. 4.3 Understand harvesting, farm-level processing techniques, grading and marketing of processed produce. 4.4 Maintain implements for harvesting,					
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13						
WEEK	General Objective: 5.0 Understand the production cycle of major industrial crops in Nigeria.					
14	5.1 Describe the life cycle of major industrial crops e.g. cotton Jatropha, Jute, Kenaf, Sisal, Sweet Sorghum, Sugar cane, Tobacco etc. 5.2 Appreciate the yield capacity and profitability of the major industrial crops	Discuss the life cycle of major industrial crops e.g. cotton Jatropha, Jute, Kenaf, Sisal, Sweet Sorghum, Sugar cane, Tobacco etc. Discuss the yield potential and profitability of major industrial crops.	White board, markers, slide and LCD projectors, laptop computers.	See in practice the life and production cycles of crops in 5.1	Accompany students.	Suitable visit venues.

15	in 5.1.					
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PROGRAMME: GENERAL STUDIES

COURSE TITLE: COMMUNICATION IN ENGLISH II

CODE: GNS 202

PREREQUISITE: GNS 201

DURATION: 2 HOURS PER WEEK (30 HOURS PER SEMESTER)

CREDIT UNITS: 2.0

SCHEDULE:**2ND SEMESTER****GOAL(S):**

This course is designed to equip the student with the necessary level of competence and proficiency to enable him adapt to his professional environment. At the end of this course, the student should be able to communicate clearly and effectively in both general and specific situations.

GENERAL OBJECTIVES:

On completion of this course the student should:

- 1.0 Understand registers
- 2.0 Understand the principle of correspondence
- 3.0 Know how to apply the principle of writing for publication.
- 4.0 Know how to write a report.

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	General Objective: 1.0 Understand registers			General Objective:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	On completion of this course the student should: Registers 1.1 Explain registers 1.2 Explain factors influencing register, viz., field (profession, mode (speech or writing), tenor (relationship between the interacting parties)	Registers 1.1 Explain registers 1.2 Explain factors influencing register, viz., field (profession, mode (speech or writing), tenor (relationship between the interacting parties)				

2	1.3 List some items of register peculiar to different professions 1.4 Identify items of register in a given passage	1.3 List some items of register peculiar to different professions 1.4 Identify items of register in a given passage				
3	1.5 State appropriate uses of jargon.	1.5 State appropriate uses of jargon.				

	General Objective: 2.0 Understand the principle of correspondence					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
3	Correspondence 2.1 Describe different types of business letters, e.g.	Correspondence 2.1 Describe different types				

	applications, enquiries, invitations and complaints, with their replies	of business letters, e.g. applications, enquiries, invitations and complaints, with their replies				
4	2.2 Use suitable language for a specific type of letter	2.2 Use suitable language for a specific type of letter				
5	2.3 Write the letters listed in 2.1 above.	2.3 Write the letters listed in 2.1 above.				

	General Objective: 3.0 Know how to apply the principle of writing for publication.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
	Writing for Publication 3.1 Explain techniques of writing for publication	Writing for Publication 3.1 Explain techniques of writing for publication				
	3.2 Write essays on topical and current issues 3.3 Analyse published essays of literary value	3.2 Write essays on topical and current issues 3.3 Analyse published essays of				

		literary value				
	3.4 Evaluate the development of ideas in a given article	3.4 Evaluate the development of ideas in a given article				
	3.5 Write good articles for publication	3.5 Write good articles for publication				

	General Objectives: 4.0 Know how to write a report.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
10	Reports 4.1 Define a report 4.2 List the types of report	Reports 4.1 Define a report 4.2 List the types of report				
11	4.3 Enumerate uses of reports	4.3 Enumerate uses of reports				
12	4.4 List the characteristics of a good report	4.4 List the characteristics of a good report				
13	4.5 Outline the stages of writing a report	4.5 Outline the stages of writing a report				

14	4.6 Evaluate a given report	4.6 Evaluate a given report				
15	4.7 Write a report	4.7 Write a report				
	5.0 Know how to write a report.	5.1 Write a report				

	Program:	Course Code: COM002	Contact Hours: 3 hours /week
	Subject/Course: Computer Applications II		Theoretical: 0 hours /week
	<i>Year: 1</i> <i>Semester: 2</i>	<i>Pre-requisite:</i>	<i>Practical:</i> 3 hours /week

General Objectives

The module gives to the student the basic skills allowing him to develop and present a power presentation, use the world wide web and to use an E-mail application.

1. Develop and present a power point presentation.
2. Use efficiently the world wide web and use efficiently a search engines
3. Setup and use correctly an Email application.

	Department:	Course Code: G202	Contact Hours: 3 hours /week
	Subject/Course: Computer Applications 2		Theoretical: 0 hours /week
	<i>Year: 1</i> <i>Semester: 2</i>	<i>Pre-requisite:</i>	<i>Practical:</i> 3 hours /week

	<i>Theoretical Content</i>			<i>Practical Content</i>		
	General Objective: Develop and Present a power point presentation					
Week	Learning Outcomes	Teacher’s activities	Resources	Learning Outcomes	Teacher’s activities	Resources
1				Perform the basic operations Start/End the application Create, open, modify, save and close a presentation.	Show how to: - Run the application. - Open a presentation. - Create new presentation (default template). - Save under other name. - Save the presentation with different types such as : RTF, PPS, PPT, image file format and other	PC connected to an OHP with appropriate operating system & Power point presentation of

				Adjust Settings Work with slides - Add, delete, copy, move slide. -customize -Proofing. -save	versions. - switch between open presentations. - Zoom in/out and use zoom tools. - Switch between different views of a presentation - Create a new presentation using the default template , Edit , Save , Open and Close a presentation - Apply design templates to a presentation and to change between designs	lectures Online lecture notes Internet access. Smart board/ white board
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2				Know how to Format the slide content Format text	Show how to: Create a presentation, new presentation, save a presentation , add slides , theme	PC connected to an OHP with appropriate operating system & Power point presentation of lectures Online lecture notes Internet access. Smart board/ white board
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3				Know how to: -enter text, select text ,copy and paste , cut and paste , undo/redo , spell check , formatting text , change font typeface and size, font styles and effects ,change text colour, word art, change paragraph alignment, text direction, adding content ,adding picture.	Demonstrate how to: -enter text, select text ,copy and paste , cut and paste , undo/redo , spell check , formatting text , change font typeface and size, font styles and effects ,change text colour, word art, change paragraph alignment, text direction, adding content ,adding picture.	PC connected to an OHP with appropriate operating system & Power point presentation of lectures Online lecture notes Internet access. Smart board/ white board
4				Know how to: Adding shape, adding smart art, adding a photo album , create a table , enter data in a table , modify the table structure and format a table, insert a table from word or excel, create a chart , edit chart data , modify a chart ,use slide effects.	Show how to: Adding shape, adding smart art, adding a photo album , create a table , enter data in a table , modify the table structure and format a table, insert a table from word or excel, create a chart , edit chart data , modify a chart ,use slide effects.	PC connected to an OHP with appropriate operating system & Power point presentation of lectures Online lecture notes Internet access.

						Smart board/ white board
5				Know how to: - -Use slide show options -setup slide show -rehearse timings -create speaker notes -Print a presentation -package a presentation	Demonstrate how to: - -Use slide show options -setup slide show -rehearse timings -create speaker notes -Print a presentation -package a presentation	PC connected to an OHP with appropriate operating system & Power point presentation of lectures Online lecture notes Internet access. Smart board/ white board

	General Objective: Use efficiently the world wide web and use efficiently a search engines.
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Week	Learning Outcomes	Teacher's activities	Resources	Learning Outcomes	Teacher's activities	Resources
6				Understand Internet , internet protocols , internet structure ,email , the world wide web, remote access ,file sharing ,steaming media ,voice telephony.	Explain: Internet , internet protocols , internet structure ,email , the world wide web, remote access ,file sharing ,steaming media ,voice telephony.	Networked PC lab An OHP connection to a PC. Internet access. Different internet browsers
7				Know how to Surf the web with internet explorer Understand the web -using internet explorer7 -basic web surfing -using tabbed browsing Searching from the	-Explain how to surf the web: -using internet explorer7 -basic web surfing -using tabbed browsing Searching from the browser.	Networked PC lab An OHP connection to a PC. Internet access. Different internet browsers

				browser.		
8				Know how to save your favouritepages , print the pages.	Demonstrate how to : Save your favouritepages , print the pages.	Networked PC lab An OHP connection to a PC. Internet access. Different internet browsers
9				Be able to: Print/ Preview a document. Modify page setup options. Print a Web page Present a search report	demonstrate how to: Printing / Preview a document. Printing a framed Web site Modify page setup options. Present a search report as a printed	Networked PC lab An OHP connection to a PC. Internet access. Different internet browsers

					document.	
10				Know how to: -send and receive Email. -setup your Email account -understand the windows mail window	demonstrate how to: -send and receive Email. -setup your Email account -understand the windows mail window	Networked PC lab An OHP connection to a PC. Internet access. Different internet browsers

	General Objective: Setup and use correctly an Email application.					
Week	Learning Outcomes	Teacher's activities	Resources	Learning Outcomes	Teacher's activities	Resources
11				Know how to Create an e-mail account Be able to: Sending and receiving Email	Explain how to Be : Send and receive Email	Networked PC lab An OHP connection to a PC.

						Internet access. Different internet browsers
12				Know how to: • Open the Inbox folder • Create a new message • Send the message..	Demonstrate how to: -compose a message, reading new messages, reply to a message, sending files via email, attaching a file to an email message, opening an email attachment.	Networked PC lab An OHP connection to a PC. Internet access. Different internet browsers

13				Understand: -spam blocking -Phishing filter -virus protection -using address book to manage personal contacts.	Explain: -spam blocking -Phishing filter -virus protection -using address book to manage your contacts.	Networked PC lab An OHP connection to a PC. Internet access. Different internet browsers
14				Understand: Different types of connections	Demonstrate how to: - traditional dial-up - broadband and DSL -broadband cable -broadband satellite.	Networked PC lab An OHP connection to a PC. Internet access. Different internet

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						browsers
15				Know how to: -setting up a new connection -connecting in vesta and windows xp -sharing internet -connect to public hotspot.	Demonstrate how to: -setting up a new connection -connecting in vesta and windows xp -sharing internet -connect to public hotspot.	Networked PC lab An OHP connection to a PC. Internet access. Different internet browsers

ASSESSMENT (%)					
	Continuous	Mid Semester	End Semester	Total	
Practical	20	20	60		100

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PROGRAMME: NATIONAL DIPLOMA IRRIGATION AGRONOMY TECHNOLOGY								
COURSE: IRRIGATION AGRONOMY II			CODE: IAT 211		Credit Unit: 3.0		CONTACT HOURS: 4	
GOAL: The course is designed to enable the students understand irrigation requirements, scheduling, efficiency and improved agronomic practices GENERAL OBJECTIVES: On completion of the course, the student should be able to: 1.0 Understand irrigation water requirement 2.0 Understand irrigation efficiency 3.0 Understand irrigation scheduling 4.0 Understand effective rainfall 5.0 Understand improved agronomic practices under irrigation								
GENERAL OBJECTIVE 1.0: Understand irrigation water requirement								
THEORETICAL CONTENT				PRACTICAL CONTENT				
Specific Learning Outcome		Teachers’ Activities	Learning Resources	Specific Learning Outcome	Teachers’ Activities		Learning Resources	Evaluation
1.1 Explain irrigation water requirement		Elaborate on irrigation water requirement	White board, Markers, Textbooks					Quiz, test, report etc
1.2 Explain gross irrigation water requirement with worked examples		Discuss gross irrigation water requirement with worked examples	White board, Markers, Textbooks, calculators, standard tables, etc					Quiz, test, report etc
1.3 Explain net								Quiz, test, report etc

irrigation water requirement with worked examples	Discuss net irrigation water requirement with worked examples	White board, Markers, Textbooks, calculators, standard tables, etc				
1.4 Estimate seasonal water requirement using worked examples.	Compute seasonal water requirements using worked examples	White board, Markers, Textbooks, calculators, standard tables, etc				
2.0 GENERAL OBJECTIVE 2.0: Understand irrigation efficiency						
THEORETICAL CONTENT			PRACTICAL CONTENT			
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
2.1 Explain irrigation efficiency	Discuss Irrigation efficiency	White board, Markers, Textbooks				Quiz test, reports etc

2.2 Explain water conveyance efficiency with worked examples.	Discuss water conveyance efficiency with worked examples.	White board, Markers, Textbooks, Internet, calculators, standard tables.			Calculator and writing materials	Quiz, test, etc
2.3 Explain water application efficiency with worked examples.	Discuss water application efficiency with worked examples.	White board, Markers, Textbooks, Internet, calculators, standard tables.			Calculator and writing materials	Tests, assignments, and examination
2.4 Explain water storage efficiency with worked examples.	Discuss water storage efficiency with worked examples.	White board, Markers, Textbooks, Internet, calculators, standard tables.				Tests, assignments, Practical reports and examination
2.5 Explain water distribution efficiency with worked examples.	Discuss water distribution efficiency with worked examples.	White board, Markers, Textbooks, Internet, calculators, standard tables.				Tests, assignments, Practical reports and examination
2.6 Explain water use efficiency with worked examples.	Elaborate on water use efficiency with worked examples.	White board, Markers, Textbooks, Internet, calculators, standard tables.				Tests, assignments, Practical reports and examination

3.0 GENERAL OBJECTIVE 3.0: Understand irrigation scheduling						
THEORETICAL CONTENT			PRACTICAL CONTENT			
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
3.1 Explain irrigation scheduling	Discuss Irrigation scheduling	White board, Markers, Textbooks, checkbook				Test, assignments, reports and examination
3.2 Explain the importance of irrigation scheduling	Discuss the importance of irrigation	White board, markers, textbooks,				Tests, assignment

3.3 Explain the factors affecting irrigation scheduling	scheduling Discuss the factors affecting Irrigation scheduling	White board, markers, textbooks, checkbook				and examination Tests, assignment and examination Tests, assignment and examination
3.4 Explain the criteria for optimum irrigation scheduling E.g. plant criteria based on soil water status and meteorological criteria	Elaborate on the criteria for optimum irrigation scheduling as in 3.4	White board, markers, textbooks , checkbook				Tests, assignment and examination
3.5 Explain the methods for determining irrigation scheduling	Discuss the methods for determining irrigation scheduling	White board and markers and textbooks, check book				Quiz, test, assignment and examination
4.0 GENERAL OBJECTIVE 4.0: Understand effective rainfall						
THEORETICAL CONTENT			PRACTICAL CONTENT			
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
4.1 Explain the concept of effective rainfall	Discuss effective rainfall	White board, markers,				Test, assignments,

4.2 Explain the factors affecting effective rainfall	Discuss the factors affecting effective rainfall	textbooks White board, markers, textbooks				and examination Test, assignment and examination
4.3 Explain how to determine effective rainfall	Discuss how to determine effective rainfall	White board and markers and textbooks				Test, assignment and examination
4.4 Explain the components of effective rainfall and their measurement	Discuss the components of effective rainfall and their measurement	White board and markers and textbooks	Carryout measurement of effective rainfall.	Guide the students to carryout measurement of effective rainfall.	Lysimeter, evaporation pan, rain gauge, measuring cylinders, etc	Logbook reports, Test, assignment and examination

5.0 GENERAL OBJECTIVE 5.0: Understand improved agronomic practices under irrigation

THEORETICAL CONTENT

PRACTICAL CONTENT

Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
5.1 Explain agronomic practices of legume crops under irrigation (e. g cowpea, groundnut and soybeans crops)	Elaborate on the agronomic practices of legumes under irrigation	White board, markers, textbooks	Carryout various agronomic practices of legumes under irrigation	Guide students to carryout various agronomic practices of legumes under irrigation.	Demonstration farm, farm inputs, farm tools/implements, etc	Test, assignments and examination.

5.2 Explain agronomic practices of cereals under irrigation (e . g rice, maize and wheat crops etc.)	Discuss the agronomic practices of cereals under irrigation	White board, markers, textbooks	Carryout various agronomic practices of cereals under irrigation	Guide students to carryout various agronomic practices of cereals under irrigation.	Demonstration farm, farm inputs, farm tools/implements, etc	Test, assignments and examination.
5.3 Explain agronomic practices of fibre crops under irrigation (e . g cotton, kenaf and jute crops)	Discuss the agronomic practices on fibre crops under irrigation	White board, markers, textbooks	Carryout various agronomic practices of fibre under irrigation	Guide students to carryout various agronomic practices of fibre crops under irrigation.	Demonstration farm, farm inputs, farm tools/implements, etc	Test, assignments and examination
5.4 Explain the agronomic practices of sugar crops under irrigation (e. g sugar cane and sugar beet)	Discuss the agronomic practices on sugar crops under irrigation	White board, markers, textbooks	Carryout various agronomic practices of sugar crops under irrigation	Guide students to carryout various agronomic practices of sugar crops under irrigation	Demonstration farm, farm inputs, farm tools/implements, etc	Test, assignments and examination
5.5 Explain agronomic practice of root and tuber crops under irrigation (e. g Potatoes, cassava,	Discuss the agronomic practices on root and tuber crops under irrigation	White board, markers, textbooks	Carryout various agronomic practices of root and tuber crops under irrigation	Guide students to carryout various agronomic practices of root and tuber crops under irrigation	Farm work and practical logbook/report book	Test, assignments and examination

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PROGRAMME: NATIONAL DIPLOMA (ND) IN IRRIGATION AGRONOMY TECHNOLOGY							
COURSE: DRAINAGE TECHNOLOGY I CODE:IAT 212 Credit Unit:3.0 CONTACT HOURS:45							
GENERAL OBJECTIVE: on completion of the course the student should be able to: 1. Understand soil particle, bulk density, porosity and intra-profile drainage. 2. Understand soil water retention capacity. 3. Understand Runoff and its application in conservation and drainage measures. 4. Understand the Principles of Infiltration and Percolation.							
GENERAL OBJECTIVE 1.0: Understand soil particle, bulk density, porosity and intra-profile drainage.							
THEORETICAL CONTENT				PRACTICAL CONTENT			
Specific Learning Objectives:	Teachers' Activities	Learning Resources	Specific learning Objectives.	Teachers' Activities	Learning Resources	Evaluation	
1.1 Explain the term particle density	Define the term 'particle density'.	magic board, cardboard, Projector	Determine particle density under laboratory conditions.	Guide the students to determine particle density in laboratory.	Soil science Laboratory, soil samples, etc	Tests, assignments and examination.	
1.2 Explain Bulk density and its types – Wet and dry bulk density.	Discuss bulk density, types of bulk density.	magic board, cardboard, Projector					
1.3 Explain porosity of soils.	Describe porosity of soils	magic board, cardboard, Projector	Determine soil porosity from undisturbed soil samples.	Guide the students to carry out laboratory analysis using undisturbed	Soil science laboratory, soil auger	Tests, assignments and examination.	

1.4 Describe the various methods of determining bulk density	Explain the various methods of determination of bulk density	magic board, cardboard, Projector	Determine bulk density using different methods	samples to determine soil porosity. Guide the students to carry out laboratory analysis using various methods with collected samples from the field.		Tests, assignments and examination.
1.5 Explain the importance of particle density and bulk density in soil classification.	Elaborate the importance of particle density and bulk density in soil classification.				Soil science laboratory	Tests, assignments and examination.
1.6 Illustrate graphically the correlation between soil moisture content and porosity.	Depict graphically the correlation between soil moisture content and porosity					Tests, assignments and examination.

1.7 Discuss how to compute soil moisture content from particle and bulk densities on wet and dry basis using worked examples	Explain how to perform a mathematical computation as in 1.7	magic board, cardboard, Projector			Soil science laboratory, calculators	Tests, assignments and examination
GENERAL OBJECTIVE 2.0 Understand soil water retention capacity.						

2.1 Explain soil water and factors influencing it.	Elaborate soil water and factors influencing it.	magic board, cardboard, Projector				Assignments, tests and Examination
2.2 Describe the characteristics of capillary water.	Explain the characteristics of capillary water					Assignments, tests and Examination
2.3 Explain gravity potential	Discuss gravity potential	magic board, cardboard, Projector				
2.4 Explain the importance of gravity potential in intra-profile drainage	Enumerate the importance of gravity potential in drainage.	magic board, cardboard, Projector.				Assignments, tests and Examination
GENERAL OBJECTIVE 3.0 Understand Runoff and its application in conservation and drainage measures						
3.1 Explain runoff and its sources	Explicate runoff and its sources.	Magic board, cardboard and projector				Test, Assignment and Examination

3.2 Describe the runoff process	Delineate the runoff process	Magic board, cardboard and projector				Test, Assignment and Examination
3.3 Describe the various factors affecting runoff	Enumerate the factors affecting runoff	Magic board, cardboard and projector				Test, Assignment and Examination
3.4 Estimate runoff from equivalent rainfall.	Determine the runoff from equivalent rainfall.					Test, Assignment and Examination
3.5 Conduct runoff measurements using current meter, floats, weirs, and flumes		Magic board, cardboard and projector	Carryout measurements of runoff using appropriate equipments	Guide the students to measure runoff	Flumes, weirs, current meter, floats hydrograph etc	Test, Assignment and Examination

3.6 Explain the terms and units of hydrograph and analyse hydrograph readings	Discuss hydrograph and hydrograph reading					
GENERAL OBJECTIVE 4.0: Understand the Principles of Infiltration and Percolation						
4.1 Define infiltration and Percolation.	Discuss infiltration and percolation.	Magic board, cardboard and projector				Assignment, test and examination
4.2 Explain methods of determining infiltration capacity.	Elaborate on the methods of infiltration capacity.	Magic board, cardboard and projector	Carry out measurements of infiltration capacity in a soil.	Assist the students to determine infiltration capacity in a soil.	Infiltrimeters, stop watches, hammer, clearing tools (hoe) etc	Assignment, test and examination
4.3 Explain factors affecting in filtration	Discuss factors affecting infiltration					

IRRIGATION PRACTICE II

PROGRAMME: NATIONAL DIPLOMA (ND) IN IRRIGATION AGRONOMY TECHNOLOGY						
COURSE: Irrigation Practices II		COURSE CODE: IAT 213				CONTACT HOURS: 60HRS
Course Specification: Theoretical Contents			Practical Contents			
Goal : The goal of this course is to abreast the student with clear understanding of different irrigation methods and the structures that are used in making water available to plants.						
General Objective on completion of the course the student should be able to: 1.0. Understand the features of basic irrigation structures 2.0 Understand operations and maintenance of different irrigation methods 3.0 Understand the criteria for choosing irrigation methods 4.0 Understand the principles of irrigation water measurement structures						
General Objective 1.0. Understand the features of basic irrigation structures						
Theoretical contents			Practical contents			
Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources	Evaluation
1.1Discuss the features of gates for diverting and controlling irrigation water.	Explain the features of gates for diverting and controlling irrigation water	Soft and hard copies of notes,magic boards, markers, projectors, computers, video clips and pictures	Identify the features of gates for diverting and controlling irrigation water	Accompany the students to sites and guide them to identify the features of these structures	School Farms and/or excursions to the site with the these structures	Exams tests and assignments
1.2 Describe the features and use of main, distribution and field channels	Explain the features and use of main, distribution and field channels	Soft and hard copies of notes, magic boards, markers, projectors, computers, video clips	Identify the features and use of main, distribution and	Accompany the students to sites and guide them in identifying the features of these structures	School Farms and/or excursions to the site with the	Exams, tests and assignments

1.3 Explain the meaning of seepage and how it affects irrigation activities	Describe using Darcy's law of flow through porous medium with worked examples	and pictures Soft and hard copies of notes, magic boards, markers, projectors, computers, video clips and pictures	field channels		these structures	Exams, tests and assignments
1.4 Describe the features and uses of drop structures	Explain the features and uses of drop structures					
General Objective 2.0 Understand operations and maintenance of different irrigation methods						
Theoretical contents			Practical contents			
Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources	Evaluation
2.1 Describe the salient features, operation and maintenance of surface irrigation methods	Explain the main features and associated problems in operation maintenance of Furrow, Basin, Check Basin irrigation methods	Soft and hard copies of notes, magic boards, markers, projectors, computers, video clips and pictures	Carryout operation and maintenance of surface irrigation methods	Guide the students to carryout operation and maintenance of surface irrigation methods	School Farms and/or excursions to the site with the these structures	Exams, practicals, tests and assignments
2.2 Describe the salient features in operation and maintenance of, pressurized irrigation methods	Explain the main features and associated problems in operation and maintenance of Drip and Sprinkler irrigation	Soft and hard copies of notes, magic boards, markers, projectors, computers, video	Carryout operation and maintenance of pressurizedirrigation method	Guide the students to carryout operation and maintenance of pressurizedirrigation methods	School Farms and/or excursions to the site with the these	Exams, practicals, tests and assignments

	methods	clips and pictures			structures	
2.3 Describe the salient features in operation and maintenance of, soilless irrigation methods	Explain the main features and associated problems in operation and maintenance of Aquaponics and Hydroponics	Soft and hard copies of notes, magic boards, markers, projectors, computers, video clips and pictures	Carryout operation and maintenance of soilless irrigation method (Aquaponics and Hydroponics)	Guide the students to carryout operation and maintenance of soilless irrigation method (Aquaponics and Hydroponics)	School Farms and/or excursions to the site with the these structures	Exams, practicals, tests and assignments
2.4 Describe the principles of Fertigation	Explain the advantages of fertigation in sprinkler, drip, hydroponics and aquaponics irrigation methods	Soft and hard copies of notes, magic boards, markers, projectors, computers, video clips and pictures				Exams, practicals, tests and assignments
General Objective 3.0 Understand the criteria for choosing irrigation methods						
Theoretical contents			Practical contents			
Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources	Evaluation
3.1 Discuss the effects of labour availability and cost in operating/maintaining surface irrigation methods	Explain the drudgery of pumping, opening water paths and low equipment cost	Soft and hard copies of notes, magic boards, markers, projectors, computers, video clips and pictures				Exams, practicals, tests and assignments

3.2 Discuss the effects of labour availability and cost in operating/maintaining pressurized irrigation methods	Explain the ease in operating pressurized system and expertise required in maintaining them	Soft and hard copies of notes, magic boards, markers, projectors, computers, video clips and pictures				Exams, practicals, tests and assignments
3.3 Discuss the effects of labour availability and cost in operating/maintaining soilless irrigation methods	Explain the ease in operating soilless irrigation system and expertise required in maintaining them					Exams, practicals, tests and assignments
3.4 Describe the capital/ energy required in establishing each of the irrigation methods	Explain the equipment /energy availability and cost in each irrigation method	Soft and hard copies of notes, magic boards, markers, projectors, computers, video clips and pictures				Exams, practicals, tests and assignments
General Objective 4.0 Understand the principles of irrigation water measurement structures						
Theoretical contents			Practical contents			
Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources	Evaluation
4.1 Define Manning's equation for flow in open channels	Explain the terms in the equation and show how to calculate the discharge	Soft and hard copies of notes, magic boards, markers,	Illustrate discharge measurement using Manning's equation	Guide the students to quantify discharge in open channels using Manning's	School Farms and/or excursions to	Exams, practicals, tests and

	with worked examples	projectors, computers, video clips and pictures	and compare with other measuring structures.	equation	the site with the these structures	assignments
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4.2 Describe the salient features of common irrigation water measuring structures, built-in weirs, flumes, gates and orifices.	Describe the shape, point of taking measurement and equations used in quantifying discharge in weirs, flumes, gates and orifices	Soft and hard copies of notes, magic boards, markers, projectors, computers, video clips and pictures	Illustrate discharge measurement using different devices	Guide the students to quantify discharge in open channels using different devices	School Farms and/or excursions to the site with the these structures	Exams, practicals, tests and assignments
4.3 Explain how to calibrate a discharge measuring structure.	Use direct method (volume/time) to calibrate different measuring structures by graphical method.	Soft and hard copies of notes, magic boards, markers, projectors, computers, video clips and pictures	Illustrate discharge measurement using different devices and use it to calibrate different measuring structures	Guide the students to quantify discharge in open channels and use it to calibrate different measuring structures	School Farms and/or excursions to the site with the these structures	Exams, practicals, tests and assignments
4.4 Explain the relevance of conveyance , distribution efficiencies in evaluating an irrigation system	Use inflow out flow method at the head and tail of the channels to calculate the efficiencies	Soft and hard copies of notes, magic boards, markers, projectors, computers, video clips and pictures	Illustrate discharge measurement using different devices at the head and tail of the channels and use it to calculate the efficiencies.	Guide the students to quantify discharge in open channels at the head and tail of the channels and use it to calculate the efficiencies.	School Farms and/or excursions to the site with the these structures	Exams, practicals, tests and assignments

PROGRAMME: National Diploma in Agricultural Technology

COURSE: AGT 212 - Agro-Climatology

DURATION: 60 Hours (2 Hours Lectures, 2 Hours Practical

UNITS: 4.0

GOAL: This course is designed to enable students to understand climatology as it affects agricultural production in the tropics.

General Objectives: On completion of this course the student will be able to:

- 1.0 Understand simple definitions and concepts in weather and climate.
- 2.0 Understand the different weather and climatic measuring instruments.
- 3.0 Understand the factors influencing climate of an area.
- 4.0 Understand the impact of weather and climate on different realms.
- 5.0 Understand the role of temperature in determining weather conditions.
- 6.0 Understand the basic pressure patterns and the predominant winds in West Africa.
- 7.0 Understand the various locations of ocean currents affecting West Africa and Africa.
- 8.0 Understand the causes of rainfall and aridity.
- 9.0 Understand the Agro-climatic regions of Nigeria and West Africa.

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: AGRO-CLIMATOLOGY			COURSE CODE: AGT 212		CONTACT HOURS: 60 HOURS (2 hrs Lectures: 2 hrs Practicals)	
GOAL: This course is designed to enable students to understand climatology as it affects agricultural production in the tropics.						
COURSE SPECIFICATION:						
	General Objective: 1.0. Understand simple definitions and concepts in weather and climate.			Practical Contents:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	1.1 Understand the following terms: - weather - climate - humidity - evaporation and evapo-transpiration - pressure and pressure	Define the climate terms listed in 1.1	White board, markers, LCD projectors and slide projectors, laptop computer	Make visual weather observations over a 2 week period and keep a weather diary.	Help students make simple visual weather observations.	Diary for each student.

2	pattern - insulation - aridity. - precipitation 1.2 Understand the relationships between weather and climate. 1.3 Understand the concept of climate as a natural resource.	Explain the relationships between climate and weather and stress the importance of considering climate as a resource.				
	General Objective: 2.0. Understand the different weather and climatic measuring instruments.			Practical Contents:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
3	2.1 Know the layout of a typical meteorological station. 2.2 Identify all common meteorological	Explain the layout and functions of a meteorological station and explain what each instrument measures	White board, markers, LCD projectors and slide projectors, laptop computer	See the instruments working in the meteorological station.	Organize students' trip to meteorological station and demonstrate the function of various	Meteorological station.

	instruments in the institution's meteorological station: i. rain gauge; ii. anemometer iii. thermometer (both minimum and maximum and earth thermometers) iv. solarimeter etc. 2.3 Understand what variable each instrument in 2.2 above measures. 2.4 Understand the technology of meteorological instruments. 2.5 Know how to measure various weather parameters using the instruments in 2.2 above.	and how that information is used for agriculture. Explain how the measuring instruments work and how they should be used for taking		Installation and dismantling of	meteorological instrument Show students how to install and dismantle meteorological instruments. Demonstrate to	
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4		measurements.		meteorological instruments. Learn how to physically take measurements.	students how to measure weather variables	
	General Objective: 3.0. Understand the factors influencing climate of an area.			Practical Contents:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
5	3.1 Know the definition of the following:- - air masses; - ocean currents - lowland; - uplands; - valleys; - plateau. 3.2 Understand the ways in which each of the factors in 3.1 above	Describe the factors listed in 3.1 and explain how they affect climate. Describe the relationship between climate and	White board, markers, LCD projectors, laptop computer and slide projectors, climatic map of Nigeria	Visit different topographies and take measurements to determine micro-climate differences. Relate these to the farming systems in the area.	Accompany and help students on their field trip.	Suitable visit venues.

6	would affect and influence climate and agriculture over a wide area. 3.3 Identify the existence of a micro-climate in an area. 3.4 Understand the need for afforestation and the dangers inherent in indiscriminate deforestation.	vegetation Explain the importance of trees in climate and weather determination.		See first hand afforestation projects.	Organize visit to afforestation station.	
	General Objective: 4.0. Understand the impact of weather and climate on different realms.			Practical Contents:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
7	4.1 Understand the impact of weather and	Explain to the students the impact	White board, markers, LCD	See the effect of weather on the	Organize student excursion to	Suitable visit

	climate on:- i. man; ii. water cycle; iii. agriculture; iv. pests and diseases; 4.2 Know how to modify or supplement local weather.	of weather and climate on:- i. man; ii. water cycle; iii. agriculture; iv. pests and diseases. Explain how weather can be modified.	projectors, laptop computer and slide projectors	factors in 4.1	different ecologies to appreciate the role of climate/weather on the environment.	venues.
	General Objective: 5.0. Understand the role of temperature in determining weather conditions.			Practical Contents:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
8	5.1 Know the definition of temperature fields. 5.2 Understand Isotherms and know their distribution North and South of the Equator in Nigeria and West Africa.	Define temperature fields and isotherms. Use relevant maps to show students the distribution of Isotherms. Link these to farming systems.	White board, markers, LCD projectors, laptop computer and slide projectors, maps			

	General Objective: 6.0. Understand the basic pressure patterns and the predominant winds in West Africa.			Practical Contents:		
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
9	6.1 Know the high and low pressure belts of Africa and that of West Africa in particular. 6.2 Sketch and annotate the different types of prevailing winds in different seasons of the year in West Africa. 6.3 Explain the significance of wind	Use maps to describe and explain pressure belts, prevailing winds. Explain wind direction and type as	White board, markers, LCD projectors, laptop computer and slide projectors, maps	Over the course of several weeks during the academic year, students should take wind speed and direction measurements, as well as measuring atmospheric pressure, temperature and rainfall and keep a detailed weather diary.	Help students to keep their detailed weather diary.	

10	direction as major determinant of the West African weather condition. 6.4 Explain the ways in which temperature, pressure and prevailing winds affect weather and climate in the West African region.	major determinants of weather. Explain to the students the ways in which temperature, pressure and prevailing winds affect weather and climate in the West African region				
WEEK	General Objective: 7.0. Understand the various locations of ocean currents affecting West Africa and Africa.			Practical Contents:		
11	7.1 Sketch and annotate the different ocean currents around Africa and how they occur. 7.2 Understand the influence on agriculture of these current around	Use maps to describe the different ocean currents around Africa and how they occur. Explain to students the influence of	White board, markers, LCD projectors, laptop computer and slide projectors, maps			

	West Africa and the neighbouring areas.	these currents on agriculture around West Africa.				
Week	General Objective: 8.0. Understand the causes of rainfall and aridity.		Practical Contents:			
12	8.1 Understand the roles of:- i. evaporation from water surface to high altitudes; ii. water condensation; iii. high and low pressure areas and their effects; iv. the direction of air flow. 8.2 Understand the causes of varying rainfall and aridity during different seasons of the year and how these affect agricultural	Explain to the students the roles of:- i. evaporation from water surface to high altitudes; ii. water condensation; iii. high and low pressure areas and their effects; iv. the direction of air flow. Explain the causes of varying rainfall and aridity during different seasons of the year and how	White board, markers, LCD projectors, laptop computer and slide projectors			

13	activities.	these affect agricultural activities.				
Week	General Objective: 9.0. Understand the Agro-climatic regions of Nigeria and West Africa.			Practical Contents:		
14	9.1 Identify the various agro-climatic regions of Nigeria. 9.2 Apply monthly or seasonal weather statistics in a selected zone for agricultural planning. 9.3 Identify certain indicative clouds and their natural effects on rainfall. 9.4 Delimit Nigeria into monthly rainfall zones and explain the implications for agriculture. 9.5 Draw, read and interpret rainfall,	Use maps and sketches to show the students various agro-climatic regions. Show them how to manipulate and evaluate data for planning purposes.	White board, markers, LCD projectors, laptop computer and slide projectors, maps			

15	pressure, wind movements and other line columnal charts for agricultural purposes. 9.6 Interpret readings from weather measuring instruments.			Draw, read and interpret rainfall, pressure, wind movements and other line columnal charts for agricultural purposes.	Assist students to draw, read and interpret rainfall, pressure, wind movements and other line columnal charts for agricultural purposes.	Maps and data.
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PROGRAMME: National Diploma in Agricultural Technology

COURSE: AGT 215 - Soil Fertility and Crop Nutrition

DURATION: 60 Hours (2 Hours Lectures, 2 Hours Practicals)

UNITS: 4.0

GOAL: To acquaint the students with the nature and characteristics of soils and plant nutrition.

General Objectives: On completion of this course the student should be able to:

- 1.0 Understand the concept of crop nutrition.
- 2.0 Understand individual soil characteristics affecting plant growth.
- 3.0 Understand soil depth, textural and structural soil attributes and how they affect fertility.
- 4.0 Understand the influence of soil salinity and acidity on soil nutrient availability.
- 5.0 Understand soil moisture and its importance to nutrient availability and uptake.
- 6.0 Understand soil organic matter and its effects on soil nutrition.
- 7.0 Understand soil organisms and their impact on the fertility of soils.
- 8.0 Understand the principles and practice of crop nutrition management.

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE TITLE: SOIL FERTILITY AND CROP NUTRITION			COURSE CODE: AGT 215		CONTACT HOURS: 60 HRS	
GOAL: To acquaint the students with the nature and characteristics of soils and plant nutrition.						
COURSE SPECIFICATION:				Practical Contents:		
	General Objective: 1.0 Understand the concept of crop nutrition.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	2.1 Know plant nutrients and their forms of availability. 2.2 Understand the characteristics of a well nourished plant. 2.3 Understand the characteristics of a mal-nourished plant. 2.4 Identify nutritional deficiencies in crops. 2.5 Identify factors that	Enumerate and explain plant nutrients and their availability. Show pictures of well nourished plants and compare with those that exhibit deficiency. Explain plant nutrition, including nutrient deficiencies,	White board, markers, projector, laptop computer. Soil map	See well nourished and poorly nourished plants in the field.	Demonstrate well nourished and poorly nourished plants in the field. Demonstrate plants exhibiting	Plants in fields.

2	affect crop nutrition. 2.6 Identify nutrient deficiencies in crops due to various causal factors.	identify their symptoms and causes of the deficiencies in crops.		Examine plants exhibiting nutrient deficiencies.	nutrient deficiencies.	Plant samples, hand lenses.
WEEK	General Objective: 2.0 Understand individual soil characteristics affecting plant growth.					
3	2.1 Understand soil characteristics influencing plant nutrition. 2.2 Categorize the characteristics in 2.1 above into physical and chemical attributes.	Explain soil characteristics influencing plant nutrition and categorize them.	White board, markers, projector, laptop computer.	See plants growing under various soil conditions e.g. compacted, acidic, waterlogged, stony, shallow etc.	Demonstrate plants growing under various soil conditions e.g. compacted, acidic, waterlogged, stony, shallow etc.	College farms.
WEEK	General Objective: 3.0 Understand soil depth, textural and structural soil attributes and how they affect fertility.					
4	3.1 Understand soil depth and its importance in contributing to the soil nutrient reserve.	Explain the importance of soil depth.	White board, markers, projector, laptop computer.	Over 2 weeks identify effect of soil depth, texture and structure on root growth and development	Guide students to identify the various soil textural classes and soil types Guide students	Sieves, soils, pH meter, chemicals, textural triangle, spades, augers.

5	3.2 Understand the importance of structure and texture of soil in :- i. soil moisture retention ii. soil aeration iii. permeability of soil water iv. influence on root-nutrient availability v. root anchorage	Define and explain soil texture and structure and their influence on soil moisture, aeration, permeability and nutrient supply.			to identify soil profiles and measure root development.	
WEEK	General Objective: 4.0 Understand the influence of soil salinity and acidity on soil nutrient availability.					
6	4.1 Understand the concepts of soil salinity and acidity. 4.2 Know the causes of salinity and acidity 4.3 Understand how soil acidity affects nutrient	Explain soil salinity and acidity, their causes and how they affect nutrient availability	White board, markers, projector, laptop computer.	Over 2 weeks go and see examples of acidity and salinity problems on farms and other land use areas.	Accompany students	Suitable visit venues.

7	availability. 4.4 Know the impact of corrective treatments on soil salinity and acidity and how this affects nutrient availability to crops.	Explain the effect of liming on acid soils, or leaching on saline soils, and how they affect nutrient availability				
WEEK	General Objective: 5.0 Understand soil moisture and its importance.					
8	5.1 Review the definition of “soil moisture” and its importance to plant nutrition. (previously in AGT 113) 5.2 Review the different classes of soil moisture. 5.3 Review available forms of soil moisture and the unavailable forms.	Explain the relationship between soil moisture and nutrient content of soil. Explain the importance of soil moisture on nutrient availability to crops Explain how to carry out simple	White board, markers, projector, laptop computer.	Observe the different forms of soil water in the lab.	Guide students to identify and understand forms of available water.	Soils. seeds, pots, fertilizers.

9	5.4 Be aware of the importance of soil moisture on nutrient availability to crops by simple experiment.	experiments demonstrating the effect of soil moisture on nutrient availability		Carry out simple experiments to show how soil water content and quality affects nutrient availability.	Demonstrate simple experiments.	Soils, test tubes, fertilizer materials.
WEEK	General Objective: 6.0 Understand soil organic matter and its effects on soil properties.					
10	6.1 Review the sources of soil organic matter. (previously in AGT 113) 6.2 Revise the factors affecting the quantity of organic matter in the soil. 6.3 Review the following common types of organic matter and understand how each contributes to soil fertility: i. green manure ii. farm yard manure iii. compost.	Briefly explain the various sources / types of fresh organic matter, indicating factors affecting quantity of OM in the soil and link these to soil fertility and plant growth.	White board, markers, projector, laptop computer.	Identify various sources of OM and understand the practical effects of organic matter on soil	Over 2 weeks show students different types of soil with varying types and levels of organic matter and compare and contrast crop growth and development.	Suitable visit venues.

11	6.4 Review the importance of stable humus to soil fertility and plant growth. 6.5 Understand the effect of levels of organic matter on soil health.	Explain the nature and characteristics of humus and its effect on soil properties, especially nutrition.				
WEEK	General Objective: 7.0 Understand soil organisms and their impact on the fertility of soils.					
12	7.1 Revise the macro-fauna of the soil:- i. earthworms	List and explain the functions of the major soil macro fauna and flora and show	White board, markers, projector, laptop computer	Over 2 weeks identify soil micro and macro fauna and flora and observe their effects on soil	Guide students to identify the soil micro and macro fauna and flora and their	Microscope, nets, slides, petri-dishes.

13	ii. squirrels and rodents (mammals) iii. snakes, termites, crickets etc. (previously in AGT 113) 7.2 Understand the functions of the macro-fauna of the soil in relation to nutrient availability. 7.3 Revise the macro-flora of the soil and how they contribute to soil fertility 7.4 Revise the types of micro-flora of the soils:- i. bacteria ii. algae iii.fungi iv.actinomycetes. and understand how each affects soil fertility. 7.5 Understand the overall influence of soil organisms	how each influences soil fertility. List and explain the functions of the soil micro and macro flora and show how each influences soil fertility. Explain the overall role of soil organisms on soil	microscope, nets, slides.	nutrition.	effects on soil nutrition.	
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15	fertilizer to the soil. 8.4 Know how to assess the fertilizer requirement of crops. 8.5 Learn how to calculate the amount of fertilizers needed, given the area, recommended rate and kind of fertilizer material. 8.6 Understand how to handle, transport and store fertilizers.	methods of fertilizer application to the soil. Explain how to assess fertilizer requirement of crops. Explain fertilizer calculations based on recommendation for crops. Explain the correct and safe ways to handle fertilizers.		crops etc.	application methods.	Fertilizer materials, application machinery.
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Suggested assessment:

5 in-class or practical tests @ 20% each = 100%

PROGRAMME: National Diploma in Agricultural Technology

COURSE: AGT 216 - Farm Soil Management

DURATION: 75 HOURS (2 Hours Lectures, 3 Hours Practicals)

UNITS: 5.0

GOAL: This course is designed to enable students understand the general principles and practices of farm soil management.

GENERAL OBJECTIVES: On completion of this course the student should be able to:

- 1.0 Understand the importance of soil conservation.
- 2.0 Understand the nature and effects of wind erosion.
- 3.0 Understand the nature and effects of erosion by water.
- 4.0 Understand the principles and practices of sustainable cultivations.
- 5.0 Understand the principles and practices of water conservation and supply.
- 6.0 Understand the sustainable management of irrigation systems.
- 7.0 Understand the effect of climate change on soil management.
- 8.0 Understand the sustainable management of field drainage systems.

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY						
COURSE: FARM SOIL MANAGEMENT			COURSE CODE: AGT 216		CONTACT HOURS: 75 HRS	
GOAL: This course is designed to enable students to understand the principles and practices of farm soil management.						
COURSE SPECIFICATION:				Practical Contents:		
	General Objective: 1.0 Understand the importance of soil conservation.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	1.1 Understand the term erodibility. 1.2 Learn the causes and effects of soil erosion and its effect on crop production.	Explain the term erodibility and describe the causes and effects of soil erosion on crop production.	White board, markers, projector, laptop computer.	See the macro effects of soil erosion on crop production.	Accompany students.	Suitable visit venues.
2	1.3 Learn about the basic methods of erosion control.	Outline the basic methods of erosion control.		See existing examples of soil erosion control.	Accompany students.	

WEEK	General Objective: 2.0 Understand the nature and effects of wind erosion.					
3	2.1 Understand in detail the causes of wind erosion.	Define wind erosion.	White board, markers, projector, laptop computer.	See the detailed micro effects of wind erosion on crop production.	Take students to the field to see the effects of wind erosion on crop production.	Private farms.
	2.2 Understand in detail the effects of wind erosion on crop production.	State the causes of wind erosion. List and explain the effects of wind erosion on crop production.				
4	2.3 Learn about the methods of control and prevention of wind erosion	Explain the various methods of wind erosion control e.g. soil mulching, cultivation techniques, windbreak construction, inter-row planting etc.		Learn how to practically control wind erosion of soils by constructing windbreaks, mulching soils etc	Demonstrate how to practically control wind erosion of soils by constructing windbreaks, mulching soils etc	Fields, materials.
WEEK	General Objective: 3.0 Understand the nature and effects of					

	erosion by water.					
5	3.1 Understand in detail the causes of water erosion.	Define water erosion.	White board, markers, projector, laptop computer.	See the detailed micro effects of water erosion on crop production.	Take students to the field to see the effects of water erosion on crop production.	Private farms.
	3.2 Understand in detail the effects of water erosion on crop production.	State the causes of water erosion. List and explain the effects of water erosion on crop production.				
6	3.3 Learn about the methods of control and prevention of water erosion	Explain the various methods of water erosion control e.g. soil cultivations, planting direction, drainage and water diversion.		Learn how to practically control water erosion of soils by correct groundwater management and cultivations.	Demonstrate how to practically control water erosion of soils by correct groundwater management and cultivations.	Fields, materials.

WEEK	General Objective: 4.0 Understand the principles and practices of sustainable cultivations.					
7	4.1 Understand the concept of sustainable soil management.	Explain sustainable soil management.	White board, markers, projector, laptop computer.	See examples of soil damage problems caused by poor cultivation techniques on farms and other land use areas.	Accompany students.	Suitable visit venues.
8	4.2 Know the causes of soil damage.	Explain how soil can be damaged by cultivations and what effect this has on crop production.				
	4.3 Understand how soil damage affects crop growth.					
	4.4 Learn about the methods of soil damage repair e.g. sub-soiling, surface loosening.	Explain the methods of soil damage repair.		See repair operations in the field.	Demonstrate repair operations in the field.	Fields and machinery.
WEEK	General Objective: 5.0 Understand the principles and practices of water conservation and supply.					
9	5.1 Revise the principles of soil water storage and	Explain how soil water is affected	White board, markers,	See how different crops and cultivation	Demonstrate how different	Suitable sites. Spades, augers

10	movement and learn how these are affected by farmer intervention when cropping and cultivating.	by farm practices such as cultivations and crop rotations.	projector, laptop computer.	methods affect soil water content.	crops and cultivation methods affect soil water content.	etc.
	5.2 Learn about new techniques of growing crops to maximize water conservation e.g. Direct drilling, Min-Till, strip cropping, mulching, plastic sheeting, soil management to improve infiltration rate etc.	Explain new techniques of growing crops to maximize water conservation		See new techniques in action to help increase water conservation.	Accompany students.	Suitable venue sites
WEEK	General Objective: 6.0 Understand the sustainable management of irrigation systems.					
11	6.1 Understand the importance of optimizing the use of applied water in	Explain the importance of optimizing the use	White board, markers, projector,	Produce an irrigation balance sheet for a specific crop over a	.Demonstrate how to produce an irrigation	Rain gauges, calculators, meteorological

12	crop production. 6.2 Understand the practicalities of irrigation scheduling. 6.3 Investigate new techniques and technologies for maximizing water conservation when irrigating e.g tail water return systems, new developments in water application machinery.	of applied water in crop production. Show students different methods of scheduling. Explain new techniques and technologies for maximizing water conservation when irrigating e.g. tail water return systems, new developments in water application machinery.	laptop computer.	period of several months. See new technologies in action on farm. .	balance sheet and how this is used to schedule water application on crops. Accompany students.	data e.g transpiration rates. Suitable visit venues.
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WEEK	General Objective: 7.0 Understand the effect of climate change on soil management.					
13	7.1 Understand how changes in temperature and rainfall patterns will affect the soil's ability to sustain crop production. 7.2 Understand how soil management techniques will need to change to allow for climate change.	Explain how changes in temperature and rainfall patterns will affect the soil's ability to sustain crop production. Understand how soil management techniques will need to change to allow for climate change.	White board, markers, projector, laptop computer.	Continue with irrigation balance sheets.		

Week	General Objective: 8.0 Understand the sustainable management of field drainage systems.					
14	8.1 Understand the role that drainage plays in sustainable soil management. 8.2 Understand the concept of drainage water harvesting, treatment and storage. 8.3 Learn about new technologies for more	Explain the role that drainage plays in sustainable soil management. Explain the concept of drainage water harvesting, treatment and storage. Explain new technologies for more efficient	White board, markers, projector, laptop computer.	See examples of drainage water harvesting etc.	Accompany students.	Suitable visit venues.

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15	efficient drainage.	drainage.		See examples of new drainage technology.	Accompany students.	Suitable visit venues.
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PROGRAMME: Agricultural and Bio-Environmental Engineering Technology: National Diploma

COURSE: ABET 213 IRRIGATION AND DRAINAGE

DURATION: 60 Hours (2Hour Lecture, 2 Hours Practical)

UNIT: 4.0

GOAL: This course is designed to enhance the student's knowledge of the principles and of irrigation and drainage of agricultural lands.

GENERAL OBJECTIVES:

On completion of this course, the students should be able to:

1.0 Understand the concept of irrigation and drainage

2.0 Know the water requirement of Crops.

- 3.0 Understand surface and ground water as the major sources of irrigation water.**
- 4.0 Know irrigation structures and pumps.**
- 5.0 Know crop watering systems and requirements.**
- 6.0 Understand the methods and structures for drainage, flood and tide control.**

PROGRAMME: AGRICULTURAL ENGINEERING TECHNOLOGY: NATIONAL DIPLOMA.						
COURSE: Irrigation and Drainage			COURSE CODE: ABET 213		CONTACT HOURS: 60 HOURS (2 hr lecture: 2 hrs practical)	
GOAL: this course is designed to enhance the student's knowledge of the principles and of irrigation and drainage of agricultural lands.						
COURSE SPECIFICATION: : Theoretical Content					Practical Contents:	
	General Objective : 1.0 Understand the concept of irrigation and drainage					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	1.1 Understand the basic principles associated with irrigation and drainage	Give the definitions and explain the relationships between irrigation and drainage	Chalk or magic board, cardboard display, slides.	Students should understand interrelationships between irrigation and drainage	To clarify the difference between the two by demonstration and video shows	Chalk or magic board, cardboard display, video projector.
2	1.2 Understand the problems associated with irrigation and drainage practices.	Give some of the likely problem associated with irrigation and drainage	Chalk or magic board, cardboard display, slide of irrigation or drainage fields.	Student should recognize the problems associated with irrigation and drainage practices.	Organise field visit to highlight specific problems associated with irrigation and drainage practices	Irrigation and drainage fields

	General Objective: 2.0 Know the water requirements of crops.					
3	2.1 Understand the different forms of soil moisture e.g., gravitational water, available water, field capacity, wilting point etc.	With drawings and simple practical demonstrate gravitational water, available water, field capacity, wilting point etc.	Chalk or magic board, drawings, slides and pictures explaining classes of soil moisture.	Understand how to measure soil moisture using appropriate equipment and tools	Demonstrate methods of determining soil moisture in the field	Field and lab equipment for determining soil moisture
	2.2 Understand the concept of available water capacity of a soil.	Define field capacity. State formula for calculating it. Using some values carryout some calculations.	Chalk or magic board, drawings, slides and pictures explaining ways of calculating water capacity of soil.	Students should be able to carry out the calculation of available water capacity of a soil.	Demonstrate methods of determining soil AWC and supervise students to carry out the same processes	Field data and equipment Practical notes.
4	2.3. Understand the problems, origins and methods of control of saline and alkaline soils.	Explain the meaning, causes and control of each	Boards, drawings, slides and pictures	Be able to collect and analyse water samples for salinity and alkalinity	Collect irrigation water and test for alkalinity. Oversee students in carrying out analysis	PH and EC meter and other lab apparatus.
5	2.4. Understand how to determine consumptive water use by different methods using	Explain the procedures of determining the consumptive use of water by different methods.	Boards, drawings, slides and pictures	The students should recognise how to determine water use consumption using different methods.	Demonstrate different methods of determining water consumption using different methods.	Chalk or magic board.

	meteorological data.					
6	2.5 Understand how to determine the evapotranspiration of a given area using lysimeter.	Explain the lysimeter and how it is used.	Drawing, picture of lysimeter	The students should understand the constructional features of the lysimeter and how to use them.	Construct a local lysimeter and use it to estimate evapotranspiration.	Local lysimeter
General Objective: 3.0 Understand the uses of Surface and Ground water as the major sources of irrigation water.						
7	3.1. Understand the major sources of surface water and how it is stored	Explain the main sources of surface water and methods of collecting and storing for agricultural use	Chalk/magic boards, drawings, slides and pictures	Recognise methods of sourcing and storing surface water for farm crops	Explain how to identify suitable surface water supplies for agriculture	Drawings, slides and video footage
8	3.2. Understand the means of storing and distributing surface water to farm plots.	Explain dam structures, construction features and water distribution methods to crops	Chalk/magic boards, drawings, slides and pictures	Recognise the main components of irrigation dams and water distribution systems	Arrange visit to irrigation dam and highlight the main features and operations	Irrigation dam
9	3.3 Understand sources of ground water and the different forms in	Explain the various forms and nature in which ground water exists.	Chalk or magic board, drawings, slides and pictures	Students should recognise the main features of water abstraction wells and	Organise visit to ground-water well and explain how the well is managed to	Groundwater abstraction site

	which it exists		explaining various forms and nature of ground water.	their management for effective water supply	ensure effective water abstraction and supply	
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	General Objective: 4.0 Know irrigation structures and pumps.					
WEEK	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
10	4.1 Identify different types of irrigation pumps and their working principles	Explain suction/ delivery heads. Explain relation between head and discharge	Boards, drawings, slides and pictures	Student should identify the different types of pump.	Visit a pump maintenance shop to identify different makes and models of pumps.	Pump maintenance and plumbing tools
	4.2 Understand the criteria for pump selection.	Explain the criteria for the selection of pumps.	Chalk or magic board, drawings, slides, pump selection manual.	Students should understand how to select pumps for specific situations	Demonstrate how to select irrigation pumps for specific water supply situations	Chalk or magic board, drawings, slides, pump selection manual.
11	4.3 Understand the maintenance requirements of irrigation pumps.	Outline the methods of maintaining irrigation pumps.	Boards, drawings, slides and pictures	Students should know the routine checks and services required of the irrigation pumps.	Demonstrate routine checks and basic maintenance requirements of irrigation pumps.	Pump maintenance schedules Manuals Tools

	General Objective: 5.0 Know Crop Watering System and requirements					
12	5.1 Understand different water application methods in irrigation e.g., surface irrigation sub-surface irrigation, sprinkler irrigation.	Explain the different water application methods and their suitability for different crops	Boards, drawings, slides and pictures	Students should be able to recognise the main features and components of different irrigation systems.	Visit irrigation fields with the students to identify the different water application methods.	Irrigation facilities and field trips.
13	6.2 Understand the factors that determine when to irrigate and how much water to apply	List the factors and explain each. Explain the process of determining crop water requirement.	Boards, drawings, slides and pictures	Students should understand how to determine irrigation requirements for different crops	Using data from crop water requirements, soil retention capacity and others, explain procedures for schedule irrigation.	Boards, drawings, slides and pictures
	General Objective: 7.0 Understand methods and structures for drainage, flood and tide control					
14	7.1 Understand the need for effective field drainage	Give definitions and effects of drainage. Explain need for drainage	Boards, drawings, slides and pictures	Recognise the difference between surface and tile drainage	List different drainage system. Differentiate between surface and tile drainage	Boards, drawings, slides and pictures
	7.2 Understand the sources of drainage problems such as salt deposits, water	List and explain the possible causes of different drainage problems.	Boards, drawings, slides and pictures	The students should recognise some of the symptoms of poor drainage.	Visit the field to identify symptoms and sources of drainage problems.	Drainage site.

	logging etc					
15	7.3. Understand the design and layout of drainage systems.	Explain steps involved in the planning the layout of drainage systems.	Chalk or magic board, cardboard drawings.	Students should know how to plan layouts for drainage structures.	Carry out layout of drainage structures and or visit irrigation site	Field trip to irrigation sites

TYPE OF ASSESSMENT	PURPOSE AND NATURE OF ASSESSMENT	WEIGHTING (%)
Examination	Written examination to test knowledge and understanding	60%
Assignment	Students to complete an essay on the importance of irrigation and drainage to the production of quality agricultural crops	40%
TOTAL		100

COURSE: EED 116 INTRODUCTION TO ENTREPRENEURSHIP

DURATION: 45 HOURS (1 Hour Lecture, 2 Hours Practical)

UNITS: 3.0

GENERAL OBJECTIVES: On completion of this module, the student should be able to:

1.0: Understand the basic concept of Entrepreneurship

2.0: Understand the roles of entrepreneurship in personal and national growth and development

General Objective 3.0: Know how to set business goals

General Objective 4.0: Know how to identify business opportunities

General Objective 5.0: Know how to draw simple business plans

COURSE: INTRODUCTION TO ENTREPRENEURSHIP			COURSE CODE: EED 116		CONTACT HOURS: 1 hour theory plus two hour practical per week	
	General Objective 1.0: Understand the basic concept of Entrepreneurship					
Week	Specific Learning Outcomes	Teacher's Activities Resources	Resources	Specific Learning Outcomes	Teacher's Activities Resources	Resources

	1.1 Explain the terms: i. Entrepreneurship ii. Entrepreneur iii. Enterprise iv. Self Employment v. Wage Employment 1.2 Compare: i. Wage Employment and Entrepreneurship ii. Self Employment and Entrepreneurship 1.3 Identify the facilities and opportunities available for self	Explain the terms related to entrepreneurship. ii. Compare wage employment and self employment with entrepreneurship. iii. Identify opportunities for self employment iv. Explain the role of entrepreneurship in wealth creation. v. Give assignment		Identify the facilities and opportunities available for self employment. Identify successful entrepreneurs in Nigeria Evaluate the role of entrepreneurship in wealth creation.	Guide students to research and identify criteria for a successful entrepreneur – Establish competitive groups. Students to make formal presentations of their findings	Guest Speakers on the role and importance of entrepreneurs' Internet and relevant web sites Guest speakers from successful businesses
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	employment. 1.4 Identify successful entrepreneurs in Nigeria 1.5 Evaluate the role of entrepreneurship in wealth creation.	vi. Organize a visit to an entrepreneur's organization.				
	General Objective 2.0: Understand the roles of entrepreneurship in personal and national growth and development					
	2.1 Explain how entrepreneurship leads to the creation of: i. Self confidence ii. Self Expression iii. Wage Employment for others iv. Self	Explain the role of entrepreneurship to national development. ii. Explain resources and constraints of	Textbooks	Explain the role of computer and information technology in entrepreneurship	Explain with the aid of a computer and application packages:- E-mail Internet, website Create: Spreadsheet	Computer and accessories Internet and relevant web sites Dbase Internet facility

	Employment 2.2 Identify resources and constraints of entrepreneurship. 2.3 Explain how entrepreneurship leads to import substitution and utilization of local resources. 2.4 Explain how entrepreneurship leads to equitable distribution of industries. 2.5 Explain the spirit of Achievement Motivation Test (A.M.T.)	entrepreneurship. iii. Explain the spirit of Achievement Motivation Test (AMT).			Invoice Purchase order etc. Students to examine web based organisations and the importance of information technology	
	General Objective 3.0: Know how to set business goals					
	3.1 Evaluate strengths,	Explain SWOT				

	weaknesses opportunities and threat (SWOT Analysis). 3.2 Explain the personal characteristics of an entrepreneur. 3.3 Explain the Entrepreneurial Tasks: i. Leadership ii. Decision-making iii. Business Planning iv. Time Management Self Management	analysis and relate it to the organization visited. ii. Explain characteristics of an entrepreneur. iii. Explain the entrepreneurial tasks. iv. Conduct Test				
	General Objective 4.0: Know how to identify business opportunities					
	4. 1 Define business opportunity. 4.2 Identify the process of	Explain business opportunities and process of		Explain the process of	Demonstrate using appropriate	Computer and accessories

	product/service selection. 4.3 State the process of exploring opportunities	exploring them. ii. Explain the process of 7 product/service selection		exploring opportunities	application package. Product selection product tracking order tracking Use the on-going business project to encourage students to identify business opportunities	Dbase Text Book Internet and relevant web sites
	General Objective 5.0: Know how to draw simple business plans					
	5.1 Define the concept of business plan. 5.2 Explain the process of preparing	Explain the concept of business plan and project proposal.		Explain the process of preparing preliminary	Guide students in preparing preliminary project.	Computer complete with accessories and: Dbase

	preliminary project proposal. 5.3 Explain the process of preparing a detailed) business plan. 5.4 Conduct a modest business plan on a selected venture (The written business plan should be assessed as part of the continuous assessment).	Guide students in preparing a modest business plan. Give final presentation		project proposal. Explain the process of preparing a detailed business plan. Conduct a modest business plan on a selected ven	On going Business Project to complete a Business Plan and to present it to a penal of successful entrepreneurs. Sales forecasting Business plan Time sheet analysis Employee tracking Loan Amortization etc. Explore internet for: Company profile	Internet connection Text book Internet and relevant web sites
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					Product catalogue Product information URL Management	
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ASSESSMENT STRUCTURE

TYPE OF ASSESSMENT	PURPOSE AND NATURE OF ASSESSMENT (SDV 201)	WEIGHTING (%)
Examination	Final Examination (written) to assess knowledge and understanding	60
Test	At least 1 progress test for feed back.	40
TOTAL		100

PROGRAMME: IRRIGATION AGRONOMY TECHNOLOGY (NATIONAL DIPLOMA)						
COURSE: DRAINAGE TECHNOLOGY II		CODE:IAT 222		Credit Unit:3	CONTACT HOURS:45HRS	
GOAL: The course is designed to teach the students how to practice different drainage techniques for better crop productivity						
GENERAL OBJECTIVE : On completion of the course the students should be able to:						
1.0 Understand agricultural drainage patterns and drainage systems terminologies						
2.0 Understand the Principles of Drainage Design						
3.0 Understand field and soil survey for drainage designs of Agricultural land						
4.0 Understand surface drainage systems						
5.0 Understand Sub-surface drainage systems						
GENERAL OBJECTIVE : 1.0 Understand agricultural drainage patterns and drainage systems terminologies						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers’ Activities	Learning Resources	Specific Learning Outcome	Teachers’ Activities	Learning Resources	Evaluation
1.1 Define drainage in agriculture	Discuss drainage in agriculture	Magic Board, Projector				Test, Assignment and Examination
1.2 Define drainage system terminologies e.g. seepage, tiles, leaching,	Discuss drainage system terminologies as in 1.2					

trenches, manholes, channels, waterlogging, ponding, salinization etc		Magic Board, Projector				
1.3 Explain land drainage problems in Agriculture	Discuss land drainage problems in Agriculture					Test, Assignment and Examination
1.4 Explain the importance of drainage in the control of salts- affected irrigated farms	Discuss the role of drainage in the control of salts -affected irrigated farms		Identify salt - affected irrigated farms and demonstrate feasible drainage techniques for control.	Accompany students to identify salt affected irrigated sites and demonstrate feasible control techniques.	Salt affected irrigated sites,	
GENERAL OBJECTIVE: 2.0 Understand the Principles of Drainage Design						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers’ Activities	Learning Resources	Specific Learning Outcome	Teachers’ Activities	Learning Resources	Evaluation
2.1 Explain the principles of surface and subsurface drainage	Describe the principles of surface and	Magic Board, Projector				Quiz and examination

2.2 Explain the principles of combined drainage	subsurface drainage	Magic Board, Projector				
	Discuss the principles of combined drainage					
	Describe the various elements of drainage design					
2.3 Explain the various elements of drainage design	Enumerate the criteria for both surface and sub-surface drainages	Magic Board, Projector				
2.4 Explain the criteria for surface and sub-surface drainages						
GENERAL OBJECTIVE 3.0: Understand field and soil survey for drainage designs of Agricultural land						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
3.1 Discuss types of	Enumerate	Magic board and marker	Carry out a drainage survey of	Demonstrate the procedures involved in	Survey instruments e.g survey pins, Gunter	Quiz and examination

investigations in surveys – reconnaissance, preliminary and design survey for agricultural land drainage.	types of investigations in surveys – reconnaissance, preliminary and design surveys. for agricultural land drainage	Magic board and marker	a given agricultural land	field and Soil survey of agricultural land drainage	chains, theodolite, ranging poles, staffman, GPS instrument e.t.c	
3.2 Compute soil Permeability (k) (Hydraulic conductivity)	Determine soil Permeability (k) (Hydraulic conductivity) using worked examples		Demonstrate procedure for measurement of soil conductivity	Demonstrate the collection of various soil samples, extraction of moisture and measurement of hydraulic soil conductivity	Soil auger, Core samplers and soil conductivity meter	
3.3 Relate soil hydraulic conductivity to soil properties	Compare soil conductivity to soil properties					
GENERAL OBJECTIVE 4.0 Understand surface drainage systems						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning	Teachers’	Learning Resources	Specific Learning	Teachers’	Learning Resources	Evaluation

Outcome	Activities		Outcome	Activities		
4.1 Identify and describe various types of surface drainage	Enumerate various types of surface drainage	Magic board and marker	Identify various types of surface drainage	Guide students to identify various types of surface drainage in irrigated farms	Visitation to irrigated farms, figures, video clips	Quiz, assignments and examination
4.2 Explain the functions of surface drainage	Describe the functions of surface drainage					
4.3 Describe the construction methods for surface drains	Explain the construction methods for surface drains		Demonstrate the construction of simple surface drainage methods in Agriculture.	Guide students in the construction of simple surface drainage methods in the College farm.	Farm site, hoes, cutlass, shovels e.t.c	
4.4 Explain the importance of land forming in surface drainage.	Discuss the importance of land forming in surface drainage.					
4.5 Explain the maintenance of surface drainage systems.	Discuss the maintenance of surface drainage system		Carry out surface drainage maintenance.	Guide students to perform surface drainage maintenance.	Shovels, Rakes, Hoes, Hand Gloves, Rain boots, etc	

GENERAL OBJECTIVE 5.0: Understand Sub-surface drainage systems

THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
5.1 Identify the main features of sub-surface drainage.	Briefly explain the main features of sub-surface drainage.	Magic board, flip chart, marker	Demonstrate the main features of sub-surface drainage	Guide students to identify main features of sub-surface drainage	Visitation to irrigated farms, picture and video clips	Quiz, assignment/test , examination
5.2 Explain the types of subsurface drainage systems	Describe the types of sub-surface drainage system e.g Tube well drainage, Mole drain					
5.3 Explain the basic design of sub-surface drainage.	Describe the basic design of sub-surface drainage.					
5.4 Explain the maintenance of subsurface drainage	Discuss the maintenance of sub-surface drainage					

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PROGRAMME: IRRIGATION AGRONOMY TECHNOLOGY (NATIONAL DIPLOMA)			
COURSE: SOIL & WATER CONSERVATION FOR IRRIGATION	CODE: IAT 223	Credit Unit: 3	CONTACT HOURS: 45HRS
GOAL: The course is designed to enable students understand the management and conservation of soil and water for irrigation practice.			
GENERAL OBJECTIVE : On completion of the course students should be able to: 1. Understand the importance of soil and water conservation in irrigation 2. Know the various methods of soil and water conservation and their limitations. 3. Understand the importance of hydrology and meteorology to soil and water conservation. 4. Understand the basic principles and practices of erosion control 5. Understand the factors that cause land degradation 6. Understand the management of land conservation and reclamation using various methods			

GENERAL OBJECTIVE : 1.0 Understand the importance of soil and water conservation in irrigation						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
1.1 Define soil conservation	Explain soil conservation	White Marker board, Projector,				Test, Assignment and Examination
1.2 Define water conservation	Explain water conservation	Textbook				
1.3 Explain the ways by which irrigated crop production could be increased through soil conservation practices	Outline the ways by which irrigated crop production could be increased through soil conservation practices	White Marker board, Projector, Textbook				Test, Assignment and Examination
1.4 Discuss the challenges facing soil and water conservation in the field	Highlight some of the challenges faced by the soil and water conservation in the field.	White Marker board, Projector,				

		Textbook				
GENERAL OBJECTIVE: 2.0 Know the various methods of soil and water conservation and their limitations.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
2.1 Discuss the importance of soil conservation	Explain the importance of soil conservation	White Marker board, Projector,				Test, Assignment and Examination
2.2 Discuss the importance of water conservation	Explain the importance of water conservation	White Marker board, Projector,				
2.3 Discuss methods of soil conservation e.g physical, agronomic and	Explain methods of soil conservation as in 2.3	White Marker board, Projector,	Identify various techniques of soil conservation	Guide students to identify various techniques of soil conservation	Suitable sites with terraces, swales, check dams, sand dams, etc	Test, Assignment and Examination

biological 2.4 Discuss methods of water conservation e.g. physical, agronomic and biological	Explain the method water conservation as in 2.4		Identify various techniques of water conservation	Guide students to identify various techniques of water conservation	Suitable sites with terraces, swales, check dams, sand dams, etc	Test, Assignment and Examination
GENERAL OBJECTIVE 3.0: Understand the application of hydrology and meteorology to soil and water conservation						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
3.1 Discuss the hydrologic cycle and its major	Define the hydrologic cycle.	White Marker	Understand the terms precipitation, evaporation, transpiration	Accompany Student to a meteorological station	Meteorological instruments	Test, Assignment and

components.		board,	and evapo-transpiration as they apply to crop growth			Examination
3.2 Explain what meteorological data is and its importance in soil and water conservation	Discuss meteorological data and its importance in soil and water conservation	Projector,				
3.3 Understand how to take meteorological readings using the rain gauge, anemometer, thermometer, psychrometer, etc.	Explain how to calculate the necessary figures from standard meteorological data	White Marker board, Projector,	Students should be able to calculate the monthly rainfall, temperature and relative humidity figures from data sets and charts and how such information can be used in crop production	Demonstrate how to take readings with rain gauge, anemometer, thermometer, psychrometer, etc and supervise students to do the same	Meteorological instruments	
3.4 Understand how to calculate monthly and annual rainfall figures, mean rainfall, mean monthly temperature and relative humidity.	Describe the factors affecting transpiration and evapo-transpiration. Explain how to estimate rates and how this will affect crop production systems		Students should recognise how knowledge of transpiration and evapo-transpiration can be used to assist effective crop management in irrigation practice	Supervise students in calculating monthly and annual rainfall figures using data collected. Ask how such data can be used to manage crop production systems	Meteorological data	Test, Assignment and Examination
3.5 Understand how to				Organise visit to modern	modern farm	

estimate transpiration and evapo-transpiration rates over a given area.		White Marker board, Projector,		farm to demonstrate use of such data in managing irrigation and crop management practices		
3.6 Describe the factors affecting evapotranspiration for an area from meteorological data.	Delineate the factors affecting evapotranspiration of an area using worked meteorological data.	White Marker board, Projector,				
3.7 Relate rainfall characteristics of parts of Nigeria to soil and water conservation measures	Display rainfall characteristics of Nigeria to soil and water conservation.	Magic board, cardboard and projector				
GENERAL OBJECTIVE 4.0: Understand the basic principles and practices of erosion control						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation

4.1 Explain the term erosion	Discuss erosion	White board Marker, Projector,				Test, Assignment and Examination
4.2 Explain different types of erosion.	Discuss different types of erosion such as; wind and water erosion					
4.3 Explain erosion control measures	Discuss erosion control measures	Video clips, pictures,				
4.4 Explain topographic survey of erosion affected areas	Describe topographic survey of erosion affected areas	White board, Marker Projector,	Carryout topographic survey of erosion affected areas	Guide students to carryout topographic survey of erosion affected areas	Vehicle, camera, GPS, Measuring Tape, PC, etc.	Test, Assignment and Examination
4.5 Explain the factors that cause erosion.	Discuss the factors that cause erosion.	White boards, Marker Projector,				

GENERAL OBJECTIVE 5.0: Understand the factors that cause land degradation						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
5.1 Define land degradation	Explain the term land degradation	White Marker board, Projector,				Test, Assignment and Examination
5.2 Explain the ways by which land degradation process could lead to reduction in crop productivity	Describe the ways by which land degradation process could lead to reduction in crop					

such as Overgrazing, bush burning, erosion, excessive lumbering, over cropping etc 5.3 Describe the specific effects of each of 5.2 above on the ecosystem.	productivity as in 5.2 Outline the specific effects of each of 5.2 on the ecosystem	White Marker board, Projector, Textbook,				Test, Assignment and Examination
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GENERAL OBJECTIVE 6.0: Understand the management of land conservation and reclamation using various methods						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
6.1 Define Land Management	Explain the term Land Management	Marker board, Projector, Textbook,				Test, Assignment and Examination
6.2 Explain the effect of agricultural activities on the environment, such as grazing, ploughing, use of fertilizers, pesticides, Herbicides, land, soil, food, minerals etc.	Describe the effect of agricultural activities on the environment as in 6.2	White Marker board, Projector, Textbook,				
6.3 List management practices of the activities mentioned in 6.2 above.	Outline management practices of the activities mentioned in 6.2 above.	White Marker board, Projector, Textbook,				Test, Assignment and Examination
6.4 Explain the effects of some of the						

agricultural activities in 6.2 on soil nutrients 6.5 Define environmental conservation 6.6 Explain the need for environmental conservation. 6.7 List the names of organizations involved in environmental conservation and their functions. Eg NESREA, Ministry of Environment. 6.8 Describe various methods of soil reclamation such as; strip cropping, crop rotation, re-afforestation, manuring, contour	Discuss the effects of some of the agricultural activities in 6.2 on soil nutrients Explain environmental conservation Discuss the need for environmental conservation. Explain environmental conservation Outline various methods of soil reclamation as in 6.8	White Marker board, Projector, Textbook White Marker board, Projector, Textbook	Identify various methods of soil reclamation as in 6.8	Accompany students to some established farms or Research stations and	Vehicle, camera, suitable sites	Test, Assignment and Examination
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farming, terracing, careful addition of fertilizer and planting of trees.				guide them to identify various methods of soil reclamation as in 6.8		
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PROGRAMME: IRRIGATION AGRONOMY TECHNOLOGY (NATIONAL DIPLOMA)			
COURSE: IRRIGATION PRACTICE III	CODE:IAT 225	Credit Unit:4	CONTACT HOURS:60HRS
GOAL: The course is designed to teach the students how to quantify and manage Irrigation water			
GENERAL OBJECTIVE : On completion of the course students should be able to: 1.0 Understand Irrigation water measurement and Irrigation Water Requirement 2.0 Understand Irrigation Water Management in an irrigation scheme. 3.0 Understand wells as sources of irrigation water. 4.0 Understand pumps as devices to obtain water from wells 5.0 Understand the importance of storage reservoirs 6.0 Understand dams as irrigation assets			
GENERAL OBJECTIVE : 1.0 Understand Irrigation water measurement and Irrigation Water Requirement			

THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
1.1 Explain water measuring structures, units of measurement and requirements of water measuring devices.	Describe water measuring structures, units of measurement and requirements of water measuring devices.	Magic Board, Projector,				Test, Assignment and Examination
1.2 Discuss how to determine Total Water Requirement, Gross Irrigation Water Requirement and Net Irrigation Water	Explain how to determine Total Water Requirement, Gross Irrigation Water Requirement and Net Irrigation Water	Magic Board, Projector, calculators	Determine the amount of water to be applied, effective root zone depth, Moisture at field capacity, Soil Moisture before irrigation and bulk density.	Guide the student to carryout readings of the following: Amount of water to be applied, effective root zone depth, Moisture at field capacity, Soil Moisture before irrigation and bulk density.	School farm, Laboratory. Meteorological Station. Lysimeter.	Test, Assignment and Examination

Requirement of an Irrigation Scheme using worked data	Requirement of an Irrigation Scheme using worked data					
1.3 Demonstrate the categories of irrigation water requirement in an irrigation farm as in 1.2 above			Demonstrate the categories of irrigation water requirement in an irrigation farm as in 1.2 above	Accompany students to the field and guide them to acquire data as in 1.2 above.	Meteorological station using Lysimeter, theta probe.	Test, Assignment and Examination

GENERAL OBJECTIVE: 2.0 Understand Irrigation Water Management in an irrigation scheme.

THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
2.1 Discuss the problems of irrigation water	Explain the problems of irrigation water	Magic Board, Projector,	Identify the problems of irrigation water management such as water logging,	Guide students to identify drainage pattern in an irrigation farm. Show them the problems associated with irrigation	Irrigation farm and salinity meter , laboratory	

manage ment such as water logging, salinity, erosion and sodicity	management such as water logging, salinity, erosion and sodicity		salinity, erosion and sodicity	water management such as water logging, salinity, erosion and sodicity		
2.2 Explain best irrigation practices that ensures efficient use of irrigation water including Irrigation Scheduling.	Describe best irrigation practices that ensures efficient use of irrigation water including Irrigation Scheduling.	Magic Board, Projector, short video clip				
2.3 Discuss cultural water conservation methods including land levelling, crop rotation and	Explain cultural water conservation methods as in 2.3					

management of watersheds, choice of suitable water application method, suitable water distribution, adequate tillage for effective water distribution and appropriate stream size.						
GENERAL OBJECTIVE 3.0: Understand wells as sources of irrigation water.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
3.1 Explain wells as sources of groundwater for irrigation.	Discuss wells as sources of groundwater for irrigation.	Magic Board, Projector, short video clips				
3.2 Distinguish between open wells and bored wells	Differentiate between open wells and bored wells Explain the	Magic Board, Projector, short video clips				

3.3Describe the different methods of drilling wells e.g traditional method, hydraulic rotary method, reverse rotatory method, percussion and cable tool method	different methods of drilling wells as in 3.3	Magic Board, Projector, short video clips	Identify the different methods of drilling wells e.g traditional method, hydraulic rotary method, reverse rotatory method, percussion , cable tool method and show the students how to obtain well logs.	Accompany students to any on-going borehole drilling site guide them to identify the different methods of drilling wells for irrigation as in 3.3 and show the students how to obtain well logs.	Vehicle, borehole, drilling equipment, different drilling sites	
3.5Explain the essence of well casing, perforation screening and gravel packing of wells	Discuss the essence of well casing, perforation screening and gravel packing of wells		Identify well casing perforation screening and gravel packing of wells.	During field trip as in 3.3 above show the students the essence of well casing, perforation screening and gravel packing of wells	Vehicle, borehole, drilling equipment, different drilling sites	
3.4Explain the importance and procedures of geophysical	Discuss the importance and procedures of geophysical		Identify the procedures of geophysical	Guide students to conduct geophysical survey to detect the quantity of ground	Vertical electrical sounding equipment,geophones	

surveys in successful well drilling	surveys in successful well drilling		surveys in successful well drilling	water	etc	
3.6 Explain hydraulic development of wells and draw down/ discharge graphs of wells.	Discuss hydraulic development of wells and the draw down/ discharge graphs of wells.		Carryout pumping test.	During field trip as in 3.3 above show the students How to develop wells either by backwashing, surging, or compressed air method.	Vehicles, site, air compressor, drilling equipment. Etc.	
GENERAL OBJECTIVE 4.0: Understand pumps as devices to obtain water from wells						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
4.1 Explain the different types of pumps – positive displacement pumps and the centrifugal pump.	Describe the different types of pumps – positive displacement pumps and the centrifugal pump.		Identify the different types of pumps – positive displacement pumps and the centrifugal pump.	Guide the student to any pump station to identify different types of pumps – positive displacement pumps and the centrifugal pump	Pump Station	

4.2 Discuss pumping water for irrigation and drainage – understanding the power requirement and the necessary pumping plant (pump) efficiency, know the different types of pump, the dynamic head, the pump characteristic.	Explain pumping water for irrigation and drainage – understanding the power requirement and the necessary pumping plant (pump) efficiency, know the different types of pump, the dynamic head, the pump characteristic.		As in 4.1 Above.	As in 4.1 Above.	As in 4.1 Above.	
4.3 Explain how to compute of the pump Wide Range pump (WRP) rating	Describe how to determine the pump Wide Range pump (WRP) rating					
4.4 Explain the	Describe the					

selection of the power plant for the pump which adds on to the cost of the pump 4.5 Describe pump installation under the following headings; - the diesel engine and its foundations -the engine pump section -the pump and its foundations, -the coupling (either by direct or with pulley drive) -the pump house.	selection of the power plant for the pump which adds on to the cost of the pump Explain pump installation as in 4.5					
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4.6 illustrate the pump installation Using sketches and layout	Use sketches and layout to illustrate the installation.					
4.7 Explain the routine maintenance of the engine and the pump as basic requirement for the durability of the pump to supply irrigation water.	Describe the routine maintenance of the engine and the pump as basic requirement for the durability of the pump to supply irrigation water.					
GENERAL OBJECTIVE 5.0: Understand the importance of storage reservoirs						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
5.1 Explain the meaning of a	Discuss the meaning of a	Magic Board, Projector,				

storage reservoir	storage reservoir					
5.2 Explain the types of a storage reservoir – natural and Manmade reservoir	Describe the types of a storage reservoir – natural and Manmade reservoir	Magic Board,	Identify different types of storage reservoir natural and manmade reservoir	Organize field trip to any existing storage reservoir natural and manmade reservoir.	Vehicle. sites	
5.3 Explain the importance of storage reservoir in irrigation water supply	Discuss the importance of storage reservoir in irrigation water supply					
5.4 Explain the importance of the ratio of the Area and depth of a storage reservoir	Discuss the importance of the ratio of the Area and depth of a storage reservoir	Magic Board,				
5.5 Explain the	Describe the different					

different methods of calculating the storage capacity of a reservoir	methods of calculating the storage capacity of a reservoir	Magic Board, Projector,				
5.6 Discuss the flood absorbing capacity of a reservoir and its computation.	Explain the flood absorbing capacity of a reservoir and its computation.					
GENERAL OBJECTIVE 6.0: Understand dams as irrigation assets						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Specific Learning Outcome	Teachers' Activities	Learning Resources	Specific Learning Outcome	Teachers' Activities	Learning Resources	Evaluation
6.1 Define dam as a man-made impoundment across the course of a river	Explain dam as a man-made impoundment across the course of a river	Magic Board, Projector,	Identify man-made impoundment across the course of a river	Guide students to identify man-made impoundment across the course of a river during a field trip.	River, dam	

6.2 Explain the different types of dams such as concrete and earth dams	Describe the different types of dams such as concrete and earth dams	Magic Board, Projector,	Identify different types of dams such as concrete and earth dams	Guide students to Identify different types of dams such as concrete and earth dams	Suitable Sites,	
6.3 Explain the different kinds of earth dams	Describe the different kinds of earth dams	Magic Board, Projector, video clips				
6.4 Explain how to design an earth dam	Describe how to design an earth dam					
6.5 Describe the details of the construction process of an earth dam	Explain the details of the construction process of an earth dam	Magic Board, Projector, video clips				
6.6 Explain the drainage of an earth dam and its importance	Describe the drainage of an earth dam and its importance					

6.7 Explain the causes of slip and failure of earth dams and the requirement of its safety.	Describe the causes of slip and failure of earth dams and the requirement of its safety.					
6.8 Evaluate solid gravity dam, an earth dam and numerically undertake computations on dams using worked examples	Compute solid gravity dam and an earth dam using worked examples		Evaluate solid gravity dam, an earth dam and numerically undertake computations on dams	Accompany students to a field and guide them to evaluate solid gravity dam and an earth dam to obtain numerical data for computations on dams	Suitable sites, Dams	

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PROGRAMME: **NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY**

COURSE: **AGT 223 FARM POWER AND MECHANIZATION**

DURATION: **60 HOURS (1 HOURS LECTURE 3 HOURS PRACTICE/FIELD WORK)**

UNITS: **4.0**

GOAL: **This course is designed to enable the student understand various farm power and machinery sources, their methods of operation and utilization for increased agricultural out put.**

GENERAL OBJECTIVES:

On completion of this course, the student should be able to:-

- 1.0 Know sources of energy on the farm.
- 2.0 Know types of farm engines.
- 3.0 Understand tractors and their operation
- 4.0 Understand the general construction and operation of common types of tillage machinery
- 5.0 Understand the general construction and operation of common types of planting and transplanting machinery
- 6.0 Understand the general construction and operation of common types of machines for applying organic manures and artificial fertilizers.

- 7.0 Understand the general construction and operation of common types of hand sprayers, boom sprayers and crop dusters.
- 8.0 Know the general construction and operation of common types of mowers, forage harvesters, pick-balers and Combine harvesters.

- 9.0 Understand the need for proper processing and storage of crops.

PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: FARM POWER AND MECHANIZATION	COURSE CODE: AGT 223	CONTACT HOURS: 60 HRS
GOAL:	This course is designed to enable the student understand various farm energy sources, their methods of generation and utilization for increasing agricultural output.	

COURSE SPECIFICATION:				Practical Contents:		
	General Objective: 1.0 Know sources of energy on the farm.					
Week	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	1.1 List the various sources of power on the farm e.g. human; work animals; mechanical; wind; water; electrical; solar; biomass. 1.2 Compare the various farm energy sources based on the efficiency and cost of generation	Explain the various sources of farm power and their suitability for various agricultural applications	Chalk or magic board, cardboard drawings; information on potential power outputs	Observe and compare the application of different power sources in practical situations	Visits to observe different energy sources in use	Various powered farming operations
	General Objective: 2.0 Know types of farm engines.					
2	Farm engines. 2.1. Learn the constructional features of both two and four stroke engines and explain their working principles	Explain the differences between two and four-stroke petrol and diesel engines Explain the different operating	Chalk or magic board, cardboard drawings of different engines types Chalk or magic	2.1. Appreciate the constructional features of both two and four stroke engines	Demonstrate the operation of both two and four-stroke engines Demonstrate	Test engines in workshop

	2.2 Differentiate between the principle of operation of diesel (compression ignition) and petrol (spark ignition) engines.	principles of diesel and petrol engines and their use in agriculture	board, cardboard drawings;	2.2. Appreciate the differences between diesel and petrol four-stroke engines	both diesel and petrol four-stroke engines	Test engines in workshop
	General Objective: Understand tractors and their operation					
3	3.1 Recognize the various types and makes of farm tractors, including wheeled and tracked machines from different manufacturers e.g. Massey Ferguson, Steyr, John Deere, Fiat	Explain the need for different types of farm tractors and illustrate their differences and main constructional components.	Chalk or magic board, cardboard drawings; Manufacturers information sheets	3.1. Identify different farm tractors and their uses	Guide the students in the identification of different tractors and their uses	Different tractor types

4	3.2 Learn the constructional features of farm tractors such as steering, engine, transmission, final drive, implement control system. 3.3 Appreciate the mechanisms for selecting farm tractors based on their power ratings for specific jobs such as tillage, planting etc.	Explain the importance of correct tractor selection for different agricultural operations	Chalk or magic board, cardboard drawings; Manufacturers information sheets	3.2. Identify the main constructional components of farm tractors 3.3 Safely operate a farm tractor. 3.4 Carry out routine maintenance of the farm tractor such as oiling, greasing, cleaning of air filters, etc.	Guide the students in the identification of the main tractor components Instruct the students in the safe operation of a farm tractor Explain the maintenance requirements for farm tractors	Different tractor types Tractors for driving Tractor Workshop tools
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	General Objective: 4.0 Understand the general construction and operation of common types of tillage machinery.					
5	4.1 Recognise and appreciate the need for different draft cultivation implements, and their methods of operation	Describe the need for, and general operating practices of different draft cultivators	Chalk or magic board, line diagrams of different implements, including sub soilers, moldboards; disc; chisel and ridging ploughs, harrows etc	4.1 Appreciate the differences between draft cultivation implements, and their methods of operation	Demonstrate the different operating practices of draft cultivators	Different cultivators Tractor Field space for demonstration
	4.2 Recognise the different ground and power driven cultivators and harrows	Describe the need for, and general operating practices of different ground and power driven cultivators and harrows	Chalk or magic board, line diagrams of different cultivators	4.2 Appreciate the differences between various ground and power driven cultivators and harrows	Demonstrate the different operating practices of ground and power-driven draft cultivators	Different cultivators Tractor Field space for demonstration
6	Know the general construction with simple line diagrams of ground driven and power driven harrows and cultivators.					

	General Objective: 5.0 Understand the general construction and operation of common types of planting and transplanting machinery.					
7	5.1 Appreciate the different types of planters, seed drills and transplanters.	Describe the general construction and operation of common types of planters, seed drills and transplanters	Chalk or magic board; simple line diagrams of common machines.	5.1. Recognise the different types of planters, seed drills and transplanters.	Explain and demonstrate the differences between different types of drills and planters	Different drills and transplanters Component parts of implements
8	5.2 Understand the importance of correct calibration of seed drills used for different crops. .	Explain the importance of correct calibration of seed drills used for different crops.	Chalk or magic board; Calibration charts	5.2 Be able to calibrate a seed drill for specific crops	Demonstrate calibration techniques and guide the students to do their own calibration	Seed Drills Calibration charts Calibration equipment: balance scales, bucket, etc

	General Objective: 6.0 Understand the general construction and operation of common types of machines for applying organic manures and artificial fertilizers.					
9	6.1 Understand the need for different machines for applying organic manures and artificial fertilizers.	Describe the construction and operation of machines for applying organic manures and artificial fertilizers.	Chalk or magic board; simple line diagrams of common machines	6.1 Understand the construction and operation of common types of manures and fertilizer distributors	Describe the working principles of common types of machines for applying organic manures and artificial fertilizers	Different machines used for the application of manures and artificial fertilisers
	General Objective: 7.0 Understand the general construction and operation of common types of hand sprayers, boom sprayers and crop dusters.					
10	7.1 Appreciate the general construction and operation of common types of hand sprayers, boom sprayers and crop dusters.	Describe the working principles of common types of hand sprayers, boom sprayers and crop dusters.	Chalk or magic board; simple line diagrams of common machines	7.3 Understand the need for correct calibration and maintenance of crop sprayers	Explain the maintenance requirements of common types of hand sprayers, boom sprayers	Crop sprayers and dusters Calibration equipment Spare parts for

					and crop dusters.	equipment
	General Objective: 8.0 Know the general construction and operation of common types of mowers, forage harvesters, pick-up balers and combine harvesters.					
11	8.1 Appreciate the range of machinery used for mowing and forage harvesting	Describe the general construction and operating practices of mowers and foragers.	Chalk or magic board; simple line diagrams of common machines	8.1. Recognise the different mowers and forage harvesters and their methods of operation	Explain and identify the main features of mowers and forage harvesting machinery	Mowers Forage harvester
12	8.2.Appreciate the different types and operating methods of pick-up balers	Describe the general construction and operating principles of balers	Chalk or magic board; simple line diagrams of common machines	8.2. Recognise the main features and operating practices of balers	Explain the operation of balers and identify their main component parts	Balers Baler component parts: eg knotters Manufacturers information
	8.3. Appreciate the method of operation of combine harvesters	Describe the general construction and operation of combine harvesters.	Chalk or magic board; simple line diagrams of common machines	8.3. Understand the operation of combine harvesters	Explain the operating principles of combine harvesters	Combine harvester Combine

13						components such as threshing drum and concave, sieves, straw walkers, etc Manufacturers information
	General Objective: 9.0 Understand the need for proper processing and storage of crops.					
14	9.1. Appreciate the need for effective storage and processing of agricultural crops – grains, cereals, tubers, fruits and vegetables	Explain the unique qualities of agricultural products and the need for effective storage and processing	Chalk or magic board; diagrams of different storage facilities	9.1. Understand the main methods and facilities for storage of local agricultural crops	Visit to a range of different crop storage facilities and explain how to manage them effectively	Local storage facilities Drawings of typical facilities
15	9.2. Understand the main methods of primary processing of local crops	Explain the methods of primary processing of agricultural crops	Chalk or magic board; diagrams of different processing equipment	9.2. Understand the operation of different processing equipment	Demonstrate the operation of different processing machinery for local agricultural crops	Range of different processing equipment Component parts of machines

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PROGRAMME: NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY

COURSE: AGT 226 - HORTICULTURAL CROP PRODUCTION.

DURATION: 60 Hours (2 HOURS THEORY, 2 HOURS PRACTICALS).

UNITS: 4.0

GOAL: This course is designed to acquaint students with the principles and practice of horticulture.

General Objectives:

On completion of this course the student should be able to:

- 1.0 Understand the scope of horticulture and classify horticultural crops.
- 2.0 Understand the different methods of propagating horticultural plants.
- 3.0 Understand the principles of soil sterilization for horticultural crop nurseries
- 4.0 Understand the principles and techniques of fruit crop cultivation, orchard establishment and maintenance.
- 5.0 Understand the principles and practice of cultivating various types of vegetables
- 6.0 Understand the principles and practices of ornamental horticulture.

PROGRAMME:NATIONAL DIPLOMA IN AGRICULTURAL TECHNOLOGY		
COURSE TITLE: Horticultural Crop	COURSE CODE: AGT	CONTACT HOURS:2HOURS THEORY ;2HOURS PRACTICALS.

Production		226				
GOAL: This course is designed to acquaint students with the principles and practices of horticulture.						
COURSE SPECIFICATION:				Practical Contents:		
	General Objective: 1.0 Understand the scope of horticulture and classify horticultural crops.					
Week	Specific Learning Objective	Teachers Activities	Learning Resources	Specific Learning Objective	Teachers Activities	Learning Resources
1	1.1 Outline the scope of horticulture. 1.2 List the unique characteristics of horticultural plants. 1.3 Understand the role of horticulture in the Nigerian economy. 1.4 Identify the different types of horticultural plants. 1.5 Classify common horticultural crops on the following basis: i..life-cycles of the plants ii.structures and forms	Define the term Horticulture. Outline and explain the scope, unique characteristics and economic roles of horticultural crops. Identify and classify horticultural crops with relevant examples.	Lecture notes, Marker board	See examples of horticultural enterprises See examples of	Accompany students Guide the	Suitable visit venues

2	of the plants. iii. uses of the plant and parts used.	.		common horticultural crops .	students to see examples of horticultural crops in each of the classes.	Crops.
	General Objective: 2.0 Understand the different methods of propagating horticultural plants.					
3	2.1 Identify the differences between vegetative and sexual propagation. 2.2 Compare and contrast the advantages and disadvantages of vegetative and sexual propagation. 2.3 Understand the process of germination and know the factors affecting seed germination. 2.4 Identify the qualities of a good seeds. 2.5 List and learn the methods of testing seed	Explain sexual and vegetative propagation of horticultural crops. Outline and explain the advantages and disadvantages of sexual and vegetative propagation. Describe the process of seed germination and explain the factors affecting seed germination. Outline and explain qualities of a good seed and methods of testing seed viability, e.g.	Lecture materials	See examples of sexual and vegetative propagation.	Demonstrate.	Seeds of peppers, okra, cucumber, etc. Suckers of pineapple

4	viability. 2.6 Know the process of pre-conditioning seeds to stimulate germination. 2.7 Know factors affecting viability of seeds. 2.8 Learn the different methods of sowing seeds:- a. sowing in situ b. sowing in the nursery.	germination test . Describe methods of breaking the dormancy of seeds e.g. soaking in water, hot water treatment, etc. Describe the following methods of sowing seeds: i. in-situ. ii. drilling. iii. broadcasting. iv. raising of seedlings in the nursery.		Carry out laboratory work on seed viability using a given sample of seeds. Pre-condition seeds to stimulate germination. See examples of seeds meant for planting. Attempt to break dormancy of seeds. Practice methods of sowing seeds of horticultural crops. Raise seedlings in the field using the methods in 2.8		Okra seeds, jute mallow seeds, water, white cloth, etc
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5	2.9 Understand the natural means of vegetative propagation:- a. suckers b. rhizomes c. tubers d. bulbs e. corms	Describe the following methods of natural vegetative propagation: i. suckers. ii. rhizomes. iii. tubers. iv. corms. v. bulbs.		above. Propagate plants by vegetative methods: a. cuttings b. layering c. grafting d. budding.	Demonstrate	Seeds, fields or plots. Sowing equipment
6	2.10 Know the various methods of artificial propagation: a. cutting b. layering c. grafting d. budding.	Explain the following artificial methods of vegetative propagation: i. use of cuttings. ii. layering. iii. grafting iv. budding.			Demonstrate	Plants, pots, compost.

	General Objective: 3.0 Understand the principles of soil sterilization for horticultural crop nurseries.					
7	3.1 Understand the concept of soil sterilization and its objectives. 3.2 Know the methods of sterilizing soil : 1) steam method 2) chemical 3.3 List and learn the uses of sterile soil, and techniques.	Define soil sterilization and outline its objectives Describe the two major methods of soil sterilization: i. heat methods. ii.chemical methods. State the uses of sterile soils	Lecture materials.	Practice soil sterilization and explain methods of sterilizing soil for nursery planting	Demonstrate	Soil samples,water, sawdust, kerosene stove.
	General Objective: 4.0 Understand the principles and techniques of fruit crop cultivation, orchard establishment and maintenance..					
8	4.1 Identify economic fruits and fruit trees.	Classify fruit crops into:	Lecture materials.	See examples of fruits and fruit	Accompany	Suitable visit venues.

9	Learn their botanical and common names and their importance to the Nigerian economy. 4.2 Identify the different varieties of each fruit in 4.1 above and learn their growth requirements. 4.3 Understand the principles and practices of orchard establishment: i.raising of seedlings and suckers in the nursery. ii.land clearing. iii.marking-out. iv.holing. v.transplanting. 4.4.Learn maintenance	a .fruits e.g .pineapple and pawpaw. .b. fruit trees .e.g. citrus and mango. Explain their importance in Nigeria. Describe the agronomy of the fruits and fruit trees. Describe the principles and practices of orchard establishment.: i. nursery practices. ii .land preparation iii. transplanting		trees. See examples of different varieties of fruit. Learn the techniques of establishing fruit orchards. Establish an orchard/fruit garden to reflect the principles of orchard establishment	students Demonstrate. Demonstrate.	Varietal examples. Land, plants, equipment.

10	practices in established orchards of fruits listed in 4.1 above: i.weeding. ii.pruning iii.diseases and pest control. .iv.fertilizer application and manuring . 4.5 Know how to harvest and post harvest handle the fruits in 4.1 above.	Describe maintenance practices of the fruits in the orchard through : i. weeding. ii.pruning. iii.crop protection iv. fertilizer application. Explain their importance in fruit crop cultivation. Describe harvesting practices and post-harvest		Practice maintenance techniques in established orchards.. Explain post-harvest handling of fruits. Practice harvesting and handling fruits.	Demonstrate.	Established crops, tools.
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11		handling of the fruits			Demonstrate.	Crops, equipment.
	General objective : 5.0.Understand the principles and techniques of vegetable growing.					
12	5.1 Learn how to identify a site for the establishment of a vegetable garden bearing in mind the following:- a. soil type b. water availability c. climate d. topography	Describe the growth requirements of local and exotic vegetables. Identify and explain vegetable growing enterprises: i. home gardening. ii. market gardening. iii. truck gardening.	Lecture materials.	Visit local vegetable growers to see soil types, topography etc.	Accompany.	Suitable visit venues.

13	e. accessibility f. disease and pest g. market. 5.2 Know names of vegetables of economic importance in Nigeria and learn the nutritional value of vegetables. 5.3 Identify the different varieties of each vegetable in 5.2 above. 5.4 Describe the growth requirements of the vegetables listed in 5.2 above. 5.5 Know the cultural practices involved in the production of the vegetables in 5.2 above. 5.6 Know the symptoms of diseases and pests	iv. vegetables for processing. v. vegetable forcing. Identify local and exotic vegetables and their improved varieties and explain why they are important to the human diet. Describe the cultural and maintenance practices of growing local and exotic vegetables.		See different varieties of vegetables. Experience planting and growing vegetables in plots.	Demonstrate.	Plants, plots, equipment.
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14	associated with the vegetables in 5.2 above. 5.7 Understand harvesting and post harvest handling of vegetables.	Explain the importance of disease and pest control in vegetables. Show how to harvest vegetables and prepare for market.		See pest and disease control in action. Gain practical experience of harvesting and preparing vegetable crops.	Demonstrate.	Crops, sprays and sprayers, harvesting and preparation equipment.
	General Objective: 6.0 Understand the principles and practices of ornamental horticulture.					
15	6.1. Identify common ornamental plants 6.2. Classify ornamental plants according to: a. life-cycles. b. functional roles.	Identify common ornamental plants and flowers in the environment. Classify ornamental plants into: a. life-cycle e.g. annuals and perennials.		See a working nursery on a visit and then get hands on experience of planting, pruning, tending and harvesting	Demonstrate.	Suitable visit venue, plants, pots, compost, water, feed, pruning shears, harvesting equipment.

	6.3 Understand the definition of a nursery and know the different types of nurseries. 6.4 Identify suitable sites for a nursery listing criteria for the selection. 6.5 Learn the best layout of buildings in the nursery. 6.6 Establish and manage pot plants and cut flowers. 6.7 Establish and manage plants for landscape design.	b. functional roles. e. g. hedges ,accents etc Describe the technologies of nursery practices in ornamental horticulture.		nursery plants.		
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LIST OF EQUIPMENT

1.0 Irrigation Equipment

Item	Quantity	Remarks
Sprinkler Irrigation Kit 2,000	10	
Rotating Sprinkler For 1 Ha	1	
Meter for Gypsum Blocks	2	
Meter for Gypsum Blocks	2	
Gypsum Blocks	1	
Drip Irrigation Set	1	
Current Meter	1	
Irrigation Water Tester	2	
Electric Motor Pump	1	
Tensiometer	2	
Hygrometer	2	

Psychrometer	2	
Evaporator Gauge	2	
Soil Ph Meter	2	
Water Analysis Kit	3	
Potable E.C. Meter	2	
Irrigation Water Testing Set	3	
Soil Hardness Tester	2	
Soil Permeability Meter	2	
Speedy Moisture Tester	2	
Pocket Penetrometer	3	
Water Measuring Devices	3	
Weir		
Parshall Flume	2	
Cut Throat Flume	2	
Flow Meter	2	

Irrigation Equipment Store	2	
Irrigation Ring		

2.0 Green House

Item	Quantity	Remarks
Benches	10	
Plastic Pots	50	
Hand Forks	10	
Hand Towel	10	
Plastic Cups	20	
Maximum and Minimum Thermometer	1	
Windage Counter	1	
Barometers	1	
Green House	1	

3.0 Meteorological Equipment

Item	Quantity	Remarks
Stevenson's Screen	1	
Thermohydrographs	1	
Maximum and Minimum Thermometers	2	
Rain Gauge	2	
Measuring Glasses	4	
Wine Vane	2	
Anemometer	2	
Evaporimeters	2	
Hygrometers	2	
Barometers	2	
Sunshine Recorders	1	
Lysimeter		

4.0 Entomology/Pest Control Laboratory

Item	Quantity	Remarks
Magnifying Glasses	15	
Insects Cages and Cabinets	5	
Specimen Bottles	20	
Insect Nets	30	
Lamps	10	
Misc. Nets	10	
Cool Boxes	10	
Knapsacks Pressure Sprayer	2	
Motorised Mist Sprayer	1	
Handy Sprayer	5	
Ultra-Low Volume Sprayer	5	
Electro dyne Sprayer	5	
Boom Sprayer	2	

5.0 Plant Pathology Laboratory

Item	Quantity	Remarks
Autoclave	1	
Refrigerator	1	
Platinum Wire Loops	15	
Incubator	1	
Anaerobic Jar	2	
Lovibond Colour Comparators	2	
Colony Counter	1	
Centrifuge	1	
Water Bath	1	
Electronic Balance	2	
Microscopes:		
Simple	5	
Compound	5	
Standing Troughs	10	

Oven	1	
Timer Clocks	10	
Deep Freezer	1	
Stirrer (Magnetic)	2	
Slide Dispenser	1	
Test Tube Racks	5	
Bunsen Burners	10	
Flask Shaker	1	

6.0 Soil Laboratory

Item	Quantity	Remarks
Drying Oven (Soil)	1	
Ph Meter	1	
Electronic Furnace	1	
Electronic Balance	2	
Beam Balance	2	

Soil Sieve (0.2mm Mesh)	2	
Soil Sedimentation Apparatus	2	
Soil Capillary Determination Apparatus	2	
Soil Humidity Determination Apparatus	2	
Soil Testing Outfit	3	
Soil Augers	5	
Humidity Cabinet	1	
Soil Moisture Meter	2	
Soil Salt Tester	1	
Flame Photometer	1	
Spectrometer	1	
Kjedhal Apparatus	1	
Analytical Balance Meter	2	
Module Counter	1	
Micro Digester for Nitrogen	2	

Corning Eel Colorimeter	1	
Water Quality X Checker	1	
Soil Exchange Capacity Determination Apparatus	1	
Dry Oven (Plants)	1	
Vacuum Pumps	3	

7.0 FARM MACHINERY SHED

Item	Quantity	Remarks
Tractors	4	
Disc Plough	4	
Disc Harrows	4	
Disc Ridgers	4	
Wheel Trailer	2	
Stump Jumper	2	
Earth Scoop	2	
Planter	1	

Fertilizer Spreader	1	
Cereal Thrasher	1	
Rice Planter	1	

8.0 NURSERY TOOLS

Item	Quantity	Remarks
Cutting Knives	20	
Machetes	20	
Head Pans	10	
Hand Trowel	10	
Pick Axe	10	
Spade	20	
Secateurs	3	
Seed Sowers	5	
Root pruners	5	
Wheel Barrows	10	

Watering Can	15	
Planting Hoes	20	

9.0 AUDIO/VISUAL AIDS

Item	Quantity	Remarks
Video	2	
Tapes	3	
DVD	3	
Films	10	
Power Point	1	
White or Black Board	1	
Paper Handouts	1	
Overhead Projector	1	
Laptops	3	
Slides	20	
Computers	3	

Posters	20	
Television	1	
Radio	2	

10.0 SURVEY EQUIPMENT

Item	Quantity	Remarks
Quadrants	2	
Sickles	20	
Range poles	10	
Theodolites	5	
Prismatic Compass	5	
1000mm Measuring Tape	10	
Gunter Compass	5	
GPS	3	
Stadia	2	

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