



NATIONAL BOARD FOR TECHNICAL EDUCATION

PLOT B BIDA ROAD, P.M.B. 2239, KADUNA, NIGERIA

NATIONAL DIPLOMA

IN

FISHERIES TECHNOLOGY

CURRICULUM AND COURSE SPECIFICATIONS

JUNE, 2026

PREFACE

The transformation of Nigeria's agricultural sector remains central to the nation's aspirations for sustainable economic growth, food security, job creation, industrial development, and poverty reduction. As agriculture continues to evolve in response to technological advancements, climate change, emerging global market demands, and the need for increased productivity across agricultural value chains, it has become imperative to ensure that curricula in Nigerian tertiary institutions remain relevant, responsive, and aligned with contemporary industry requirements. It is against this backdrop that we embarked on the comprehensive review and modernization of Agricultural curricula for Nigerian tertiary institutions. The review process was designed to address identified skills gaps, integrate emerging technologies and innovations, strengthen entrepreneurship and employability competencies, promote climate-smart agriculture, and align training programmes with the industry expectations and global best practices. The successful execution of this important project was made possible through the invaluable support and commitment of key stakeholders. I wish to express profound appreciation to the Honourable Minister of Education for providing the policy direction and leadership that facilitated this initiative. I also extend sincere gratitude to the Honourable Minister of Agriculture and Food Security and the Honourable Minister of Livestock Development for their unwavering support, technical contributions, and commitment to strengthening agricultural education and workforce development in Nigeria. Special appreciation goes to the Tertiary Education Trust Fund (TETFund) for providing the special intervention grant that enabled the conduct of nationwide skills gap analyses and supported the series of national curriculum review and development workshops. The findings from the skills gap studies provided critical evidence and industry insights that guided the review process and ensured that the curricula reflect current and future workforce requirements within the agricultural sector.

I also acknowledge with gratitude the immense contributions of the Sector Skills Council for Agriculture, whose expertise and industry perspectives greatly enriched the curriculum development process. Equally commendable are the efforts of members of the Implementation Committee, resource persons, industry experts, professional bodies, French Embassy in Nigeria, regulatory agencies, academic institutions, employers, development partners, and other stakeholders who devoted their time, knowledge, and experience to the various workshops and technical sessions. The revised curricula represent a collective national effort to produce graduates equipped with relevant knowledge, practical skills, digital competencies, entrepreneurial capabilities, and professional attitudes required to drive innovation and productivity across Nigeria's agronomy, forestry, fisheries and livestock sectors. It is my expectation that Institutions offering these programmes will faithfully implement the curricula and continue to collaborate with industry to ensure sustained relevance and quality. I commend all stakeholders for their dedication and contributions to this landmark achievement and look forward to the successful implementation of these curricula for the benefit of our dear nation.

Professor Idris M. Bugaje, FNSE
Chairman, Implementation Committee

EXECUTIVE SECRETARY

National Board for Technical Education (NBTE), Kaduna

ACKNOWLEDGEMENT

The National Board for Technical Education (NBTE) expresses its profound appreciation to all individuals and organizations whose invaluable support, expertise, and commitment made the successful review and modernization of the Agricultural Education curricula for Nigerian tertiary institutions possible. Our sincere gratitude goes to the Honourable Minister of Education for providing the policy direction and leadership that made this national initiative possible. We also appreciate the Honourable Minister of Agriculture and Food Security and the Honourable Minister of Livestock Development for their technical guidance, collaboration, and unwavering commitment to strengthening agricultural education and workforce development in Nigeria. The Board is particularly grateful to the Tertiary Education Trust Fund (TETFund) for providing the special intervention grant that funded the nationwide skills gap analyses, stakeholder engagements, curriculum review exercises, validation meetings, and development workshops. The evidence generated through these studies provided a solid foundation for developing curricula that are relevant, industry-driven, and responsive to national and global agricultural priorities.

Special appreciation is extended to the curriculum specialists, resource persons, academic experts, professional bodies, regulatory agencies, employers, industry practitioners, development partners, and representatives of public and private sector organizations who participated actively in the skills gap studies, technical sessions, validation exercises, and curriculum development workshops. Their diverse expertise and practical insights greatly enriched the quality and relevance of the curricula. We further appreciate the support of the French Embassy in Nigeria and other development partners for their collaboration in promoting excellence and innovation in technical and vocational education within the agricultural sector. Finally, NBTE expresses its gratitude to all tertiary institutions, researchers, facilitators, rapporteurs, technical staff, and administrative personnel whose commitment and hard work contributed to the successful completion of this important national assignment. The Board acknowledges that this achievement is the result of a collective effort and remains confident that the effective implementation of these curricula will contribute significantly to producing competent, innovative, and entrepreneurial graduates capable of advancing sustainable agricultural development, food security, and economic prosperity in Nigeria.

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GENERAL INFORMATION

1.0 TITLE OF THE PROGRAMME

The programme is National Diploma in Fisheries Technology

2.0 PROGRAMME GOAL

The goal of the National Diploma in Fisheries Technology is to produce competent and skilled middle-level manpower capable of applying modern techniques in fisheries and aquaculture production, processing and management for sustainable exploitation and utilization of aquatic resources in Nigeria.

3.0 PROGRAMME OBJECTIVES

On completion of the programme, diplomates should be able to:

- i Apply basic scientific principles (biology, chemistry, physics, and mathematics) to fisheries and aquaculture practices.
- ii Establish and manage fish farms, including pond construction, water quality management, stocking, feeding, and harvesting.
- iii Carry out fish breeding and hatchery operations, including broodstock management, induced breeding, and fingerling production.
- iv Produce and manage fish feeds using locally available materials and appropriate feed formulation techniques.
- v Handle, process, preserve, and store fish and fishery products using appropriate technologies to reduce post-harvest losses.
- vi Identify and control fish diseases and parasites using standard health management practices.
- vii Operate and maintain fisheries equipment and facilities efficiently and safely.
- viii Collect, analyze, and interpret fisheries data for decision-making and resource management.
- ix Apply basic business and entrepreneurial skills in fisheries enterprises, including marketing and financial management.
- x Demonstrate effective communication skills in disseminating fisheries technologies to farmers and stakeholders.
- xi Apply environmental sustainability principles in fisheries and aquaculture practices.
- xii Comply with safety, regulatory, and quality standards in fisheries operations.
- xiii Design, Construct and operate fishing gears and crafts.

4.0 ENTRY REQUIREMENTS

Applicants with the following qualifications may be considered for admission into the National Diploma programme in Fisheries Technology; -

- a) Four (4) GCE, WASSCE, SSCE, SAISSCE, NECO or NABTEB subjects passed at not more than two sittings. The subjects must be passed at Credit level and should include English language, Mathematics, Biology/Agricultural Science and any one from the following subjects: Geography, Economics or Physics.
- b) Evidence of registration with Joint Admissions and Matriculation Board (JAMB)

5.0 STRUCTURE OF THE PROGRAMME

The National Diploma in Fisheries Technology is a terminal programme and is structured to last for two years (four semesters). This includes three to four months of Student Industrial Work Experience Scheme (SIWES) at the end of first year or the first two semesters of the programme.

6.0 CURRICULUM

Curriculums of ND programmes consist of four main components. These are:

- a General Studies/Education
- b Foundation Courses
- c Professional Courses
- d Student Industrial Work Experience scheme (SIWES) for ND.

The general education courses shall include:

- i. Art and Humanity – English Language, Communication and History. These are compulsory.
- ii. Mathematics and Science (for non-science based programmes)
- iii. Social Studies – Citizenship (the Nigerian Constitution), Political Science, Sociology is compulsory.

The general Education shall account for not more than 15% of the total contact hours for the programme.

Foundation courses include courses in Mathematics, Pure sciences, Statistics, etc. The number of hours will vary with programme and may account for about 10 – 15% of the total contact hours.

Professional Courses are courses that give the student theory and practical skills they need to practice their field of calling at the technician/technologist level. These may account for between 60 – 70% of the contact hours depending on programme.

Students Industrial Work Experience Scheme (SIWES) shall be taken during the long vacation following the end of the second semester of the first year. See details of SIWES in Guidelines to SIWES in 12.0.

6.1 CURRICULUM STRUCTURE

The structure of the ND programme consists of four semesters of classroom, laboratory and workshop activities in the college and a semester (3-4 months) of supervised industrial work experience scheme (SIWES). Each semester shall be of 17 weeks of teaching i.e. recitation, practical exercise, quizzes, test etc. and 12-16 weeks SIWES shall take place at the end of the second semester of the first year.

7.0 STAFFING REQUIREMENTS

7.1 Core Teaching Staff

A minimum of four (4) core teaching staff who should possess at least a HND in Fisheries Technology or B.Sc. in Fisheries and Aquaculture or related disciplines at good grade.

7.2 Technical Staff

Technical staff shall have ND, HND or BSc Fisheries Technology

7.3 Headship of the Department

The Head of Department shall have at least HND or First and Master's Degrees in Fisheries and Aquaculture or related field. He or she shall not be less than the rank of a Senior Lecturer and registered with a relevant professional body.

7.4 Career/Academic Prospects

The diplomate would work in Fisheries Industry, NGOs, relevant ministries, departments, agencies and parastatals. They can also proceed to HND and BSc programmes for further studies.

8.0 CERTIFICATION

A diplomate of this programme shall be awarded ND in Fisheries Technology.

9.0 ACCREDITATION

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

10.0 CONDITIONS FOR THE AWARD OF THE ND

Institutions offering accredited programme will award the National Diploma to candidates who successfully completed the programme after passing prescribed coursework, examination, diploma project and the Supervised Industrial Work Experience.

10.1 Classification of Diplomas:

Diploma can be classified as follows:

Distinction – CGPA of 3.50 and above

Upper Credit – CGPA of 3.00 – 3.49

Lower Credit – CGPA of 2.50 – 2.49

Pass – CGPA of 2.00 – 2.49

10.2 All terminal National Diploma and Higher National Diploma examinations must be externally moderated. In grading the award, the Board's unified grading system should be applied.

10.3 Grading of Courses: Courses shall be graded as follows:

MARK RANGE	LETTER GRADE	WEIGHTING
75% and above	A	4.00
70% – 74%	AB	3.50
65% – 69%	B	3.25
60% – 64%	BC	3.00
55% – 59%	C	2.75
50% – 54%	CD	2.50
45% – 49%	D	2.25
40% – 44%	E	2.00
Below 40%	F	0.0

11.0 GUIDANCE NOTE FOR THE TEACHERS TEACHING THE PROGRAMME

The new curriculum is drawn in unit courses. This is in keeping with the provision of the National Policy on Education which stress the need to introduce the semester unit 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 provide the students with technician operative skills, which can be used for employment purposes.

As the success of the credit unit system depends on articulation of programmes between the institutions and industry, the curriculum content has been written in behavioral objectives so that it is clear to all the expected performance of the student who successfully completed some of the courses or the diplomates of the programme. There is a slight departure in the

presentation of the performance based curriculum which requires the conditions under which the performance are 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 their institution under which the performance can take place and to follow that with the criteria for determining 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 programme offered throughout the polytechnic 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 each course, there should be a balance of theory to practical in the ratio of 20:80.

12.0 GUIDELINES ON SIWES PROGRAMME

For the smooth operation of the SIWES, the following guidelines shall apply: -

12.1 Responsibility for Placement of Students.

- a.) Institutions offering the ND programme shall arrange to place the students in industry. By April 30, of each year, six copies of the master list showing where each student has been placed shall be submitted to the executive secretary, NBTE which shall, in turn, authenticate the list and forward it to the Industrial Training Fund, Jos.
- b.) The placement officer should discuss and agree with the industry on the following:
 - i) A task inventory of what the students should be expected to experience during the period of attachment. It may be wise to adopt the one already approved for each field.
 - ii) The industry-based supervisor of the students during period likewise the institution- based supervisor.
 - iii) It should be noted that the final grading of the students during the period of attachment should be weighted more on the evaluation by his industry-based supervisor.

12.2 Evaluation of students during the SIWES

In the evaluation of the students, cognizance should be taken of the following items:

- (a.) Punctuality
- (b.) Attendance
- (c.) General attitude to work
- (d.) Respect for authority
- (e.) Interest in the field/technical area
- (f.) Technical competence as a potential technician in his field.

12.3 Grading of SIWES

To ensure uniformity of grading scales, the institution should ensure that the uniform grading of student's work, which has been agreed to, by all polytechnics, is adopted.

12.4 The institution-based supervisor

The institution-based supervisor should initial the logbook during each visit. This will enable him to check and determine to what extent the objectives of the scheme are being met and to assist students having any problems regarding the specific assignment given to them by industry-based supervisor.

12.5 Frequency of Visit

Institution should ensure that the students placed on the attachment are visited within one month of their placement. Other visits shall be arranged so that

- 1) there is another visit six weeks after the first visit; and
- 2) a final visit in the last month of the attachment.

12.6 Stipend for Student in SIWES

The rate of stipend payable shall be determined from time to time by the Federal Government after due consultation with the Federal Ministry of Education, the Industrial Training Fund and the NBTE.

12.7 SIWES as a Component of the Curriculum

The completion of SIWES is important in the final determination of whether the student is successful in the programme or not. The SIWES should be graded on a fail or pass basis. Where a student has satisfied all other requirements but failed SIWES, he may only be allowed to repeat another four months SIWES at his own expense.

CURRICULUM TABLE**YEAR I SEMESTER I**

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 101	Use of English I	2	0	0	2	2
2.	GNS 111	Citizenship Education I	2	0	0	2	2
3.	COM 111	Introduction to Computing	2	0	2	4	4
4.	AHP 116	Introduction to Animal Husbandry	1	0	2	3	3
5.	AGR 101	Introduction to Agriculture	1	0	2	3	3
6.	MEC 113	Basic Workshop Technology and Practice	1	0	3	4	4
7.	MSQ 111	Mandatory Skills Qualification	1	0	1	2	2
8.	FIT 111	Elements of Cell Biology in Fisheries	1	0	3	4	4
9.	FIT 112	Elements of Chemistry in Fisheries	1	0	3	4	4
10.	FIT 113	Elements of Mathematics in Fisheries	1	1	0	2	2
11.	FIT 114	Introduction to Fisheries Technology	1	0	3	4	4
12.	FIT 115	Development of Life Skills	1	0	1	2	2
	TOTAL		15	1	20	36	36

YEAR I SEMESTER II

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 102	Communication in English I	2	0	0	2	2
2.	GNS 121	Citizenship Education II	2	0	0	2	2
3.	ENT 126	Introduction to Entrepreneurship I	2	0	1	3	3
4.	FIT 121	Fish Farm Management	1	0	2	3	3
5.	FIT 122	Biology of Fishes	1	0	3	4	4
6.	FIT 123	Introduction to Aquaculture	1	0	2	3	3
7.	FIT 124	Fishing Gear and Craft Technology I	1	0	3	4	4
8.	FIT 125	Elements of Navigation and Seamanship	1	0	3	4	4
9.	FIT 126	Introduction to Fisheries Statistics and Computer Applications	1	0	2	3	3
10.	FIT 127	Elements of Physics in Fisheries	1	0	3	4	4
	TOTAL		13	0	19	32	32

YEAR II SEMESTER I

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 201	Use of English II	2	0	0	2	2
2.	ENT 216	Introduction to Entrepreneurship II	2	0	1	3	3
3.	AGR 201	Research Methods and Experimental Design	1	0	1	2	2
4.	FIT 211	Fish Farm Engineering	1	0	3	4	4
5.	FIT 212	Fish Processing, Storage and Value Addition	1	0	3	4	4
6.	FIT 213	Basic Fish Feed Production	1	0	3	4	4
7.	FIT 214	Fishing Gear and Craft Technology II	1	0	3	4	4
8.	FIT 215	Aquaculture Water Quality Management	1	0	3	4	4
9.	FIT 216	Practical Fishing	1	0	3	4	4
10.	FIT 217	Students Industrial Work Experience Scheme (SIWES)	0	0	4	4	4
TOTAL			11	0	24	35	35

YEAR II SEMESTER II

S/N	COURSE CODE	COURSE TITLE	L	T	P	CU	CH
1.	GNS 202	Communication in English II	2	0	0	2	2
2.	FIT 221	Fisheries Management	1	0	3	4	4
3.	FIT 222	Non-Food Fish and Fish Products	1	0	2	3	3
4.	FIT 223	Fish Health and Disease Management	1	0	2	3	3
5.	FIT 224	Basic Hatchery Practice	1	0	3	4	4
6.	FIT 225	Project	0	0	6	6	6
TOTAL			8	0	14	22	22



ELEMENTS OF CELL BIOLOGY IN FISHERIES

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: ELEMENTS OF CELL BIOLOGY IN FISHERIES	COURSE CODE: FIT 111	CONTACT HOURS: 4HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: 1 SEMESTER: 1	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to provide students with knowledge and skills in cell biology and its applications in fisheries technology and aquaculture system		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the concept and scope of cell biology; 2.0 Understand basic microscopy and laboratory skills; 3.0 Know structures and functions of plant and animal cells; 4.0 Understand cellular metabolism and energy production; 5.0 Know cell division processes; 6.0 Understand basic principles of genetics and heredity; 7.0 Know tissues and organs in fish; 8.0 Understand cell biology knowledge to fisheries and aquaculture.		

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY						
COURSE TITLE: ELEMENTS OF CELL BIOLOGY IN FISHERIES		COURSE CODE: FIT 111		CONTACT HOURS: 4HOURS/WEEK		
		CREDIT UNIT: 4		THEORETICAL: 1HOUR/WEEK		
YEAR: I SEMESTER: I		PRE-REQUISITE:		PRACTICAL: 3HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills in cell biology and its applications in fisheries technology and aquaculture system						
GENERAL OBJECTIVE 1.0: Understand the concept and scope of cell biology						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
1	1.1 Explain the meaning and scope of cell biology. 1.2 Explain the importance of cell biology in fisheries. 1.3 Explain fisheries applications.	• Explain the meaning and scope of cell biology • Discuss the importance of cell biology in fisheries • Discuss fisheries applications	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.			
General Objective 2.0: Understand basic microscopy and laboratory skills						

2-3	2.1 Describe a microscope. 2.2 Describe different types of microscopes. 2.3 Describe Microorganisms. 2.4 List the different types of microorganisms. 2.5 List different types of aquatic microorganisms.	- Describe a microscope - Discuss all types of microscopes - Describe Microorganisms - Explain the different types of microorganisms - Explain different types of aquatic microorganisms	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	- Identify different types of microscopes - Identify the different parts of simple microscope and their functions - Operate simple microscope - Prepare slides of microorganisms like Spirogyra, Amoeba, Paramecium - Sketch the observed microorganisms	Guide students to: - Identify different types of microscopes - Identify the different parts of simple microscope and their functions - Operate simple microscope - Prepare slides of microorganisms like Spirogyra, Amoeba, Paramecium - Sketch the observed microorganisms	Different types of microscopes, Slides, Microorganisms specimen, Practical manual etc.
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General Objective 3.0: Know structures and functions of plant and animal cells						
4-5	3.1 Describe cell and their structures. 3.2 Describe different types of cells. 3.3 Differentiate plant and animal cells. 3.4 Explain functions of cell organelles 3.5 Describe nucleus, mitochondria, ribosomes, etc.	• Explain cell and their structures • Describe different types of cells • Discuss plant and animal cells • Discuss functions of cell organelles • Describe nucleus, mitochondria, ribosomes, etc.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Identify different types of cells • Identify cell structures • Sketch well-labelled cell diagrams • Identify organelles	Guide students to: • Identify different types of cells • Identify cell structures • Sketch well-labelled cell diagrams • Identify organelles	Microscope, Slides, Onion, Spirogyra, Slides of Amoeba, Paramecium and Algae.

General Objective 4.0: Understand cellular metabolism and energy production						
6-7	4.1 Explain movement of substances across cell membranes 4.2 Explain cell membrane functions 4.3 Explain cellular metabolism 4.4 Describe Adenosine Tri Phosphate (ATP) and energy transfer. 4.5 Explain enzymes and their functions. 4.6 Explain factors affecting enzymes. 4.7 Explain selective permeability. 4.8 Explain respiration and photosynthesis. 4.9 Explain energy production.	- Describe movement of substances across cell membranes. - Describe cell membrane functions. - Explain cellular metabolism. - Describe ATP and energy transfer. - Explain enzymes and their functions. - Describe factors affecting enzymes. - Explain selective permeability. - Discuss respiration	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	- Conduct osmosis experiments - Identify membrane models - Analyze metabolic processes - Calculate energy transfer in a cell - Conduct enzyme reaction experiment	Guide students to: - Conduct osmosis experiments - Identify membrane models - Analyze metabolic processes - Calculate energy transfer in a cell - Conduct enzyme reaction experiment	Enzyme samples, Membrane models

		and photosynthesis. • Discuss energy production.				
General Objective 5.0: Know cell division processes						
8-9	5.1 Explain cell division processes. 5.2 Explain mitosis. 5.3 Explain meiosis. 5.4 Differentiate mitosis and meiosis.	• Discuss cell division processes. • Discuss mitosis • Discuss meiosis • Explain mitosis and meiosis	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc	• Observe prepared slides of mitosis and meiosis • Sketch well-labelled cell division stages • Compare stages of cell division	Guide students to: • Observe prepared slides of mitosis and meiosis • Sketch well-labelled cell division stages • Compare stages of cell division	Prepared slides, Microscope.
General Objective 6.0: Understand basic principles of genetics and heredity						
10-11	6.1 Explain genetics and heredity. 6.2 Explain genes and chromosomes. 6.3 Describe inheritance patterns.	• Explain genetics and heredity. • Discuss genes and	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips,	• Identify different strains of cultured fishes	• Guide students to identify different strains of	Goldfish, Tilapia, <i>Clarias</i> species,

	6.4 Explain Mendelian genetics. 6.5 Describe how to solve genetic problems in fishes.	chromosomes. - Describe inheritance patterns. - Explain Mendelian genetics - Discuss how to solve genetic problems in fishes	Charts, Marker, Multimedia Projector, etc.		cultured fishes	
General Objective 7.0: Know tissues and organs in fish						
12-13	7.1 Explain fish tissues. 7.2 Explain functions of tissues. 7.3 Explain fish organs. 7.4 Explain functions of organs. 7.5 Describe organ systems in fish.	- Explain fish tissues - Discuss functions of tissues - Explain fish organs - Discuss functions of organs - Describe organ systems in fish	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	- Dissect a fish specimen - Identify the tissues of the dissected fish specimen - Identify the organs of the dissected fish specimen - Identify the organ systems in the dissected fish specimen	- Guide students to: - Dissect a fish specimen - Identify the tissues of the dissected fish specimen - Identify the organs of the	Fish specimen, Dissecting set, Hand lens, Hand gloves, Microscope, Slides.

					dissected fish specimen	
					Identify the organ systems in the dissected fish specimen	
General Objective 8.0: Understand cell biology knowledge to fisheries and aquaculture						
14-15	8.1 Explain how cell biology is related to fish breeding. 8.2 Explain gametes and fertilization in fish. 8.3 Describe embryonic development in fish. 8.4 Explain environmental effects on cells. 8.5 Relate pollution to stress in fishes. 8.6 Relate water quality to cell function. 8.7 Explain toxicity effects on fish.	- Discuss cell biology in relation to fish breeding - Discuss gametes and fertilization in fish - Describe embryonic development in fish - Explain environmental effects on cells. - Discuss	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	- Identify reproductive organs in fish - Observe the developmental stages of fish embryos using a microscope	Guide students to: - Identify reproductive organs in fish - Observe the developmental stages of fish embryos using a microscope	

		pollution and stress. • Relate water quality to cell function. • Explain toxicity effects on fish				
COURSE ASSESSMENT COURSE WORK (PRACTICAL BASED): 10% TESTS (PRACTICAL BASED): 10% PRACTICAL: 40% EXAMINATION (THEORY AND PRACTICAL): 40% TOTAL: 100%						

ELEMENTS OF CHEMISTRY IN FISHERIES

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: ELEMENTS OF CHEMISTRY IN FISHERIES	COURSE CODE: FIT 112	CONTACT HOURS: 4HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE: NONE	PRACTICAL: 3HOURS/WEEK
GOAL: This course is designed to acquaint students with knowledge and skills in chemistry relevant for fisheries operations		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand basic chemical principles and concepts; 2.0 Know atomic structure and chemical bonding; 3.0 Know acids, bases, and salts used in fisheries. 4.0 Conduct simple chemical laboratory experiments; 5.0 Understand chemical reactions relevant to fisheries systems; 6.0 Know properties of organic and inorganic compounds; 7.0 Understand environmental pollution.		

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY						
COURSE TITLE: ELEMENTS OF CHEMISTRY IN FISHERIES		COURSE CODE: FIT 112		CONTACT HOURS: 4HOURS/WEEK		
		CREDIT UNIT: 4		THEORETICAL: 1HOUR/WEEK		
YEAR: I SEMESTER: I		PRE-REQUISITE: NONE		PRACTICAL: 3HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to acquaint students with knowledge and skills in chemistry relevant for fisheries operations						
GENERAL OBJECTIVE 1.0: Understand basic chemical principles and concepts						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1	1.1 Explain the meaning and scope of chemistry in fisheries. 1.2 Describe chemistry concepts in fisheries applications. 1.3 Explain the effects of chemistry on water and on the fish.	• Discuss the meaning and scope of chemistry in fisheries • Describe chemistry concepts and fisheries applications • Discuss the effects of chemistry on water and on the fish	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Artificial Intelligence (AI), etc.	.		

General Objective 2.0: Know atomic structure and chemical bonding						
2	2.1 Explain atomic structure. 2.2 Explain atoms, electrons, protons, neutrons. 2.3 Explain atomic models. 2.4 Describe elements and compounds. 2.5 Explain Chemical bonding. 2.6 Explain chemical formulas and equations.	• Discuss atomic structure • Discuss atoms, electrons, protons, neutrons. • Illustrate atomic models with labels • Discuss how compounds are formed from elements • Illustrate ionic and covalent bonds • Explain balancing of equations	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Artificial Intelligence (AI), etc.			
General Objective 3.0: Know acids, bases, and salts used in fisheries						
3-6	3.1 Describe acids, bases and salts 3.2 Explain pH concepts 3.3 Relate pH of water to fish health 3.4 Explain the effect of pH on water quality	• Explain acids, bases and salts. • Describe pH concepts • Describe effect of pH on fish health • Discuss the	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia	• Carry out practical to test acids and bases samples • Conduct pH tests of water on fishponds and other water bodies • Conduct water	Guide the student to: • Carry out practical to test acids and bases samples • Conduct pH tests of water on fishponds and	pH meter, Water samples, Litmus paper, Water test kits.

	3.5 Explain solutions and concentrations 3.6 Explain chemical concentrations.	effect of pH on water quality • Discuss dissolved oxygen, hardness, and alkalinity	Projector, Artificial Intelligence (AI), etc.	quality tests	other water bodies • Conduct water quality tests	
General Objective 4.0: Conduct simple chemical laboratory experiments						
7-9	4.1 Explain analytical chemistry techniques. 4.2 Explain laboratory safety procedures. 4.3 Explain titration. 4.4 Explain filtration. 4.5 Explain molarity and dilution.	• Discuss analytical chemistry techniques. • Discuss laboratory safety procedures • Discuss titration and filtration • Discuss molarity and dilution.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Artificial Intelligence (AI), etc.	• Demonstrate laboratory safety procedures • Determine the volume of acid used in a titration experiment • Carry out filtration experiment	Guide the student to: • Demonstrate laboratory safety procedures • Demonstrate titration and filtration methods	Laboratory equipment, Chemical reagents, PPE, Filter paper.
General Objective 5.0: Understand chemical reactions relevant to fisheries systems						

10-11	5.1 Explain chemical reactions. 5.2 Explain rates of chemical reactions. 5.3 Explain oxidation and Reduction reaction. 5.4 List factors that affect the rate of chemical reaction.	• Explain chemical reactions • Discuss the types of chemical reactions • Describe oxidation and Reduction reaction • Explain factors that affect the rate of chemical reaction	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Artificial Intelligence (AI), etc.	• Test the effect of catalyst, temperature, pH and concentration on chemical reaction	• Guide students to test the effect of catalyst, temperature, pH and concentration on chemical reaction	Chemical reagents, PPE.
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General Objective 6.0: Know properties of organic and inorganic compounds						
12-13	6.1 Describe properties of the organic compounds. 6.2 Describe inorganic compounds. 6.3 Describe the properties of inorganic compound. 6.4 Explain carbohydrates, proteins and lipids.	- Describe properties of the organic compounds - Describe inorganic compounds - Describe the properties of inorganic compound - Explain carbohydrates, proteins and lipids.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Artificial Intelligence AI, etc.	- Carry out tests for carbohydrates - Carry out test for protein - Carry out test for lipids	Guide students to carry out tests for carbohydrates, protein and lipids	Laboratory equipment, Chemical reagents, Fat, Carbohydrate, Protein, PPE.
General Objective 7.0: Understand environmental pollution						
14-15	7.1 Explain the concept of environmental chemistry. 7.2 Describe effects of pollution on fish. 7.3 Explain gas laws and dissolved gases. 7.4 Relate gases to fish survival. 7.5 Explain pollutants and toxins. 7.6 Explain toxicity effects.	- Explain the concept of environmental chemistry. - Describe effects of pollution on fish. - Explain gas laws and dissolved gases. - Relate gases to fish survival.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Artificial Intelligence (AI), etc.	Carry out chemical oxygen demand (COD) and biological oxygen demand (BOD) tests.	Guide students to: Carry out chemical oxygen demand (COD) and biological oxygen demand (BOD) tests.	Laboratory equipment, Chemical reagents, PPE.

COURSE ASSESSMENT

COURSE WORK (PRACTICAL BASED): 10%

TESTS (PRACTICAL BASED): 10%

PRACTICAL: 40%

EXAMINATION (THEORY AND PRACTICAL): 40%

TOTAL: 100%



ELEMENTS OF MATHEMATICS IN FISHERIES

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: ELEMENTS OF MATHEMATICS IN FISHERIES	COURSE CODE: FIT 113	CONTACT HOURS: 2HOURS/WEEK
	CREDIT UNIT: 2	THEORETICAL: 2HOURS/WEEK
YEAR: 1 SEMESTER: I	PRE-REQUISITE:	PRACTICAL:
GOAL: This course is designed to equip students with mathematical knowledge necessary for fisheries and aquaculture operations		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand basic arithmetic operations in fisheries calculations; 2.0 Know ratios, proportions, and percentages in aquaculture management; 3.0 Understand how to solve algebraic problems related to fisheries systems; 4.0 Know logarithms and indices in scientific calculations; 5.0 Know geometry and mensuration in pond and tank calculations; 6.0 Understand trigonometry in pond design and construction; 7.0 Perform statistical calculations for fisheries data; 8.0 Understand how to solve practical fisheries management problems mathematically.		

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY						
COURSE TITLE: ELEMENTS OF MATHEMATICS IN FISHERIES		COURSE CODE: FIT 113		CONTACT HOURS: 2HOURS/WEEK		
		CREDIT UNIT: 2		THEORETICAL: 2HOURS/WEEK		
YEAR: 1 SEMESTER: I		PRE-REQUISITE: NONE		PRACTICAL:		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with mathematical knowledge necessary for fisheries and aquaculture operations						
GENERAL OBJECTIVE 1.0: Understand basic arithmetic operations in fisheries calculations						
THEORETICAL CONTENT			PRACTICAL CONTENT			
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1	1.1 Explain importance of mathematics in fisheries. 1.2 Describe basic arithmetic operations. 1.3 Explain mathematical applications in fisheries.	• Discuss the importance of mathematics in fisheries • Solve basic arithmetic operations. • Describe mathematical applications in fisheries.	Textbooks, Encyclopedia , E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.			
General Objective 2.0: Know ratios, proportions, and percentages in aquaculture management						
2-3	2.1 Explain fractions, decimals, and percentages. 2.2 Describe feed percentages and	• Describe fractions, decimals, and percentages. • Calculate feed percentages and	Textbooks, Encyclopedia , E-books, Journals, Magazines,			

	mortality rates. 2.3 Explain ratio and proportion problems. 2.4 Describe ratio concepts in pond stocking.	mortality rates. - Solve ratio and proportion problems - Apply ratio concepts in pond stocking.	Video clips, Charts, Marker, Multimedia Projector, etc.			
General Objective 3.0: Understand how to solve algebraic problems related to fisheries systems						
4-5	3.1 Explain algebraic expressions and equations. 3.2 Apply algebra problems in fisheries calculations. 3.3 Explain linear equations. 3.4 Solve linear equations.	- Explain algebraic expressions and equations. - Apply algebra problems in fisheries calculations. - Explain linear equations	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.			
General Objective 4.0: Know logarithms and indices in scientific calculations						
6-7	4.1 Explain indices. 4.2 Explain logarithms. 4.3 Describe logarithms in scientific analysis. 4.4 Explain pH and growth calculations.	- Describe indices - Describe logarithms. - Explain logarithms in scientific analysis. - Relate pH and growth calculations	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia			

			Projector, Logarithm tables, etc.			
General Objective 5.0: Know geometry and mensuration in pond and tank calculations						
8-9	5.1 Explain geometry concepts. 5.2 Explain pond and tank dimensions. 5.3 Explain mensuration principles. 5.4 Estimate water capacity of pond/tanks.	• Discuss shapes and dimensions • Explain with practical examples how calculate pond and tank dimensions • Describe area and volume calculations • Demonstrate calculations	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.			
General Objective 6.0: Know trigonometry in pond design and construction						
10-11	6.1 Explain trigonometry basics. 6.2 Explain trigonometry in fisheries engineering. 6.3 Solve trigonometric problems.	• Introduce sine, cosine, and tangent. • Explain slope and height measurements. • Solve trigonometric problems	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Trigonometric table, etc.			
General Objective 7.0: Perform statistical calculations for fisheries data						

12-13	7.1 Explain basic statistics concepts. 7.2 Explain probability concepts. 7.3 Explain probability in fisheries analysis. 7.4 Explain graph plotting and interpretation. 7.5 Explain production and growth graphs.	• Describe mean, median, mode. • Introduce simple probability. • Discuss survival and risk estimates. • Describe graph construction. • Analyze fisheries trends • Explain production and growth graphs.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.			
General Objective 8.0: Understand how to solve practical fisheries management problems mathematically						
14-15	8.1 Explain financial mathematics. 8.2 Explain mathematics in fisheries economics. 8.3 Explain mathematical models in fisheries. 8.4 Describe mathematical analysis in management decisions.	• Discuss simple interest and cost analysis. • Explain profit calculations. • Explain production forecasting.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.			

	8.5 Solve mathematical modelling problems in fisheries.					
COURSE ASSESSMENT COURSE WORK: 20% TESTS AND ASSIGNMENTS: 20% EXAMINATION: 60% TOTAL: 100%						



INTRODUCTION TO FISHERIES TECHNOLOGY

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: INTRODUCTION TO FISHERIES TECHNOLOGY	COURSE CODE: FIT 114	CONTACT HOURS: 4HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 3HOURS/WEEK
GOAL: This course is designed to acquaint students with knowledge and skills of fisheries technology		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the concept and scope of fisheries technology; 2.0 Know the environment of fishes; 3.0 Understand basic biology of fishes; 4.0 Know fishing gears and crafts; 5.0 Understand principles of aquaculture and fish farming; 6.0 Know fish handling, preservation, and processing methods; 7.0 Understand fisheries management and conservation principles.		

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY						
COURSE TITLE: INTRODUCTION TO FISHERIES TECHNOLOGY		COURSE CODE: FIT 114		CONTACT HOURS: 4HOURS/WEEK		
		CREDIT UNIT: 4		THEORETICAL: 1 HOUR/WEEK		
YEAR: I SEMESTER: I		PRE-REQUISITE:		PRACTICAL: 3 HOUR/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to acquaint students with knowledge and skills of fisheries technology						
GENERAL OBJECTIVE 1.0: Understand the concept and scope of fisheries technology.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1-2	1.1 Explain the meaning of fisheries technology. 1.2 Explain the scope of fisheries technology. 1.3 Describe the importance of fisheries. 1.4 Explain different types of fisheries. 1.5 Explain marine fisheries, brackish water fisheries and freshwater fisheries. 1.6 Explain emerging technologies in fisheries.	• Discuss fisheries concepts and terminology. • Discuss fisheries contribution to nutrition and economy • Discuss different types of fisheries (capture fisheries, aquaculture, captured based aquaculture, Aquaculture based capture fisheries, Ornamental, cultural)	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.			

	1.7 Explain employment opportunities in fisheries.	• Explain marine fisheries, brackish water fisheries and freshwater fisheries • Discuss emerging technologies in fisheries • Explain employment opportunities in fisheries				
General Objective 2.0: Know the environment of fishes.						
3	2.1 Explain aquatic systems. 2.2 Explain freshwater aquatic system. 2.3 Explain marine aquatic systems. 2.4 Explain Brackish water systems.	• Discuss aquatic systems • Explain freshwater aquatic system (Rivers, lakes, Reservoirs, stream, marshes, swamp etc) • Explain marine aquatic systems (Oceans, lagoon, bay etc) • Explain Brackish water systems (Estuaries, River)	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.			

General Objective 3.0: Understand basic biology of fishes						
4-6	3.1 Explain basic fish anatomy and their functions. 3.2 Explain major classification of fish species. 3.3 Describe economically important species in Nigeria. 3.4 Explain fish biology and life cycle. 3.5 Explain reproduction and growth.	• Discuss basic fish anatomy and their functions • Discuss major classification of fish species • Explain economically important species in Nigeria • Discuss fish biology and life cycle. • Discuss reproduction and growth	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Sketch a well labelled the external features of a fish • Identify major fish species • Sketch some economically important fish • Label sketched economically important fishes	Guide students to: • Sketch and label the external feature of fish • Identify major fish species • Sketch economically important fishes • Label some economically important fishes	Fish specimens, Dissecting set, Dissecting board.
General Objective 4.0: Know fishing gears and crafts						
7-8	4.1 Explain gear classification. 4.2 Explain fishing methods. 4.3 Explain the factors affecting the use of gears. 4.4 Explain fishing crafts.	• Discuss gear classification • Explain fishing methods • Discuss the factors affecting the use of gears • Explain fishing	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Sketch various fishing gears • Sketch various fishing crafts with appropriate labels.	Guide students to: • Identify and sketch various fishing gears • Identify and sketch	Fishing gears, Fishing traps, Model fishing boats and crafts.

		crafts			various fishing crafts	
General Objective 5.0: Understand principles of aquaculture and fish farming						
9-11	5.1 Explain principles of aquaculture. 5.2 Explain fish farming systems. 5.3 Describe pond preparation and stocking. 5.4 Explain pond management basics. 5.5 Explain fish feeding and nutrition. 5.6 Describe water quality requirements for fish farming.	• Discuss principles of aquaculture • Discuss fish farming systems • Describe pond preparation and stocking • Discuss pond management basics. • Explain fish feeding and nutrition • Discuss water quality requirements.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Carry out pond preparation and stocking • Practice feeding of fish in ponds • Conduct simple water tests	Guide students to: • Demonstrate pond preparation and stocking • Practice feeding of fish in ponds • Conduct simple water tests	Fishponds, Fish feed, Farm models, Water testing kits.
General Objective 6.0: Know fish handling, preservation, and processing methods						

12-14	6.1 Explain fish harvesting methods. 6.2 Describe fish handling and preservation. 6.3 Explain fish processing methods. 6.4 Explain fish products and by-products. 6.5 Explain fish value addition. 6.6 Explain fish marketing systems.	• Explain fish harvesting methods. • Describe fish handling and preservation • Discuss fish processing methods. (smoking, drying, salting) • Explain fish products and by-products • Explain fish value addition • Discuss fish marketing systems.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Participate in harvesting exercises • Practice handling techniques • Carry out smoking, drying, salting • Identify fish products and by-products	Guide students to: • Participate in harvesting exercises • Practice handling techniques • Carry out smoking, drying, salting • Identify fish products and by-products	Smoking kiln, Drying rack, Salt, Dragnet, Scoopnet.
General Objective 7.0: Understand fisheries management and conservation principles						
15	7.1 Explain fisheries management and conservation principles. 7.2 Explain causes of fishery resource depletion. 7.3 Explain overfishing and pollution. 7.4 Explain fisheries laws and regulations.	• Discuss fisheries management and conservation principles. • Explain causes of fishery resource depletion. • Discuss overfishing and pollution • Explain fisheries laws and	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.			

	7.5 Describe responsible fishing practices.	regulations.				
	7.6 Describe climate change impacts on fisheries.	- Describe responsible fishing practices - Discuss climate change impacts on fisheries.				

COURSE ASSESSMENT

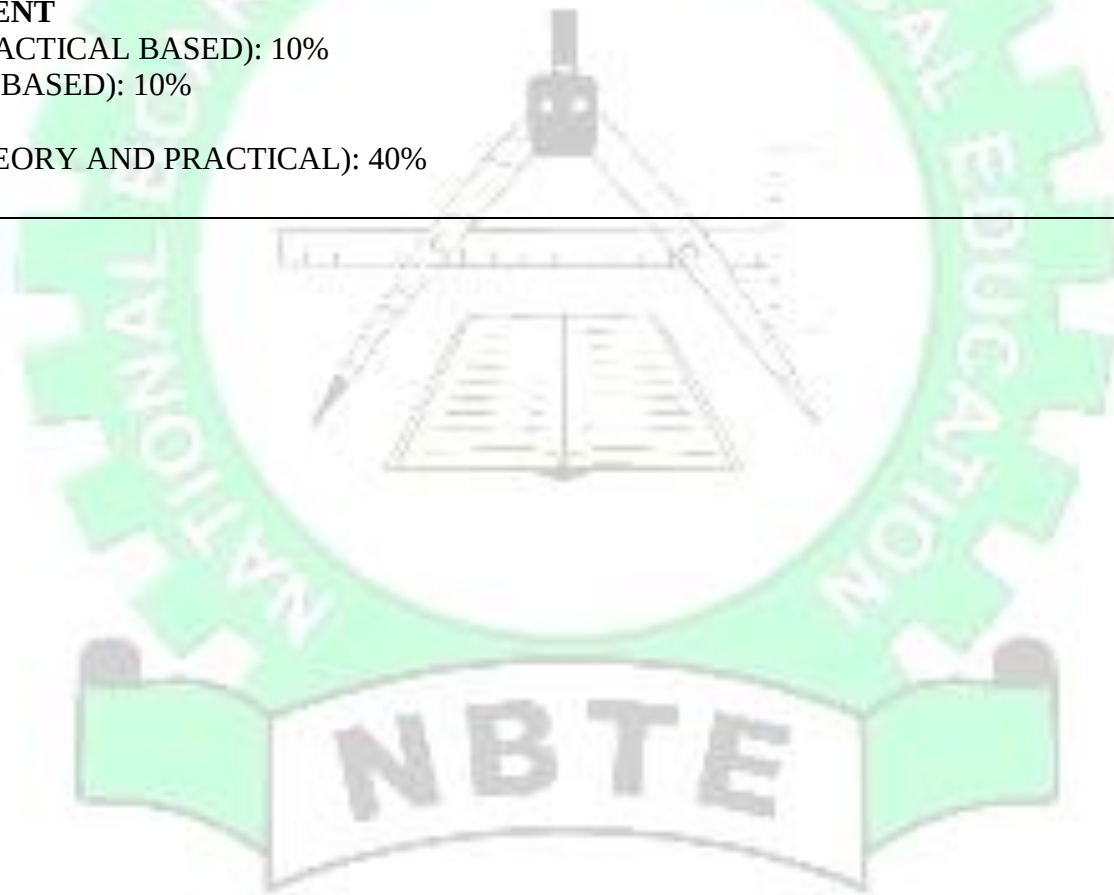
COURSE WORK (PRACTICAL BASED): 10%

TESTS (PRACTICAL BASED): 10%

PRACTICAL: 40%

EXAMINATION (THEORY AND PRACTICAL): 40%

TOTAL: 100%



DEVELOPMENT OF LIFE SKILLS

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: DEVELOPMENT OF LIFE SKILLS	COURSE CODE: FIT 115	CONTACT HOURS: 2HOUR/WEEK
	CREDIT UNIT: 2	THEORETICAL: 1HOUR/WEEK
YEAR: I SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 1HOUR/WEEK
GOAL: This course is designed to enable students acquire the necessary <i>life skills</i> and positive behaviour that can enable them deal and effectively cope with the demands and challenges of everyday <i>life</i>		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the concept of emotional Intelligence; 2.0 Know and use learning, listening and studying skills; 3.0 Understand the essentials of time management; 4.0 Know the self-control and leadership skills; 5.0 Understand personal health; 6.0 Know manners and etiquettes 7.0 Understand personal financial management.		

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY						
COURSE TITLE: DEVELOPMENT OF LIFE SKILLS		COURSE CODE: FIT 115		CONTACT HOURS: 2HOUR/WEEK		
		CREDIT UNIT: 2		THEORETICAL: 1HOUR/WEEK		
YEAR: I SEMESTER: I		PRE-REQUISITE:		PRACTICAL: 1HOUR/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to enable students acquire the necessary <i>life skills</i> and positive behaviour that can enable them deal and effectively cope with the demands and challenges of everyday <i>life</i>						
GENERAL OBJECTIVE 1.0: Understand the concept of emotional Intelligence.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1-2	1.1 Define emotion. 1.2 List positive and negative emotions. 1.3 Define emotional intelligence. 1.4 Differentiate emotional intelligence from Intelligent Quotient (IQ). 1.5 Explain personal competences. 1.6 Explain social competences. 1.7 Explain SWOT analysis.	• Explain emotion. • Discuss positive and negative emotions • Explain emotional intelligence • Discuss the difference between emotional intelligence from IQ • Explain personal competences • Describe social competences. • Explain SWOT analysis	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Artificial Intelligence (AI), etc.			
General Objective 2.0: Know and use learning, listening and studying skills						
3-4	2.1 Define learning. 2.2 Explain learning	• Explain learning • Discuss learning	Textbooks, Encyclopedia,			

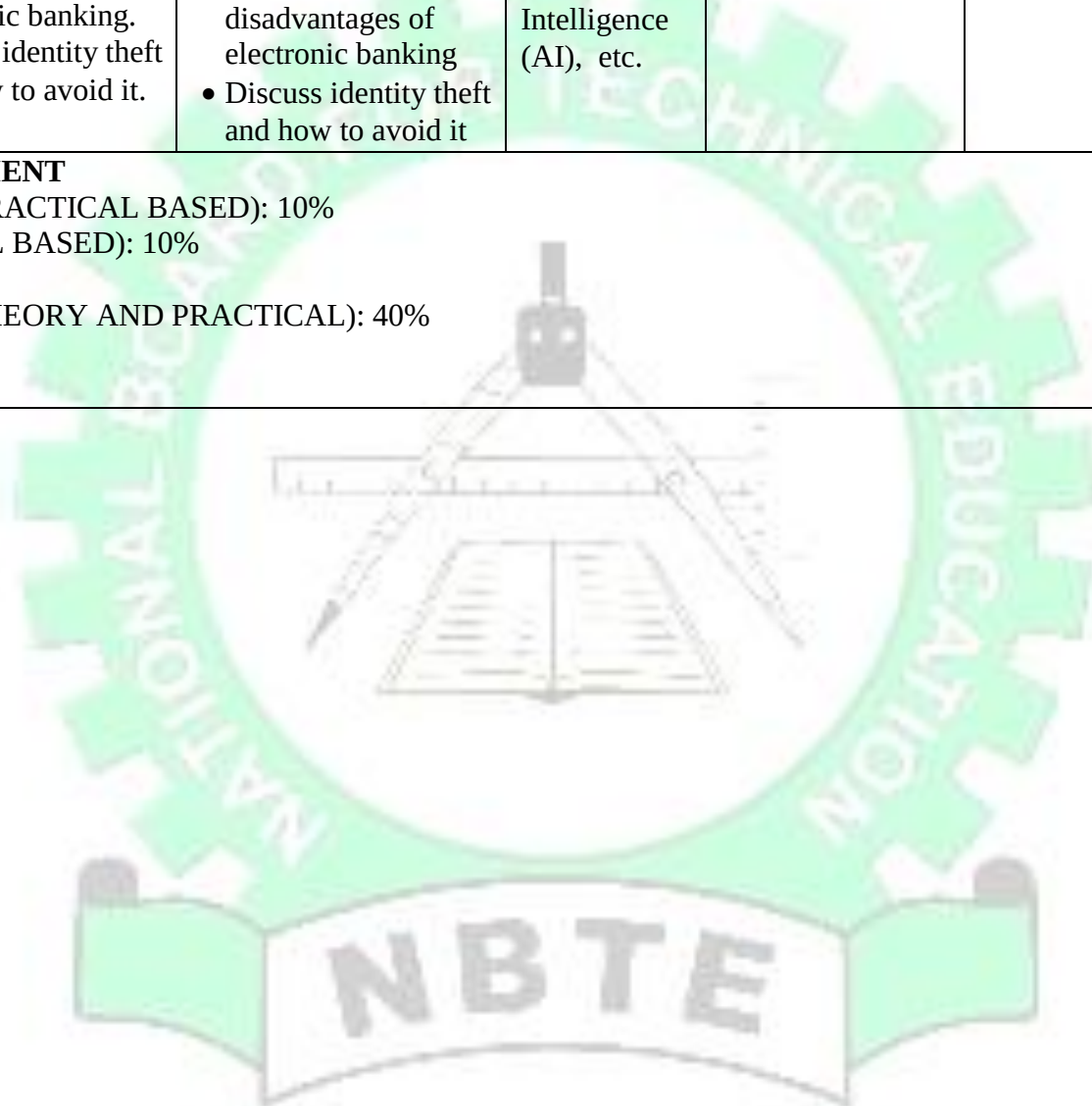
	style and type of learner.	style and type of learner	E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Artificial Intelligence (AI), etc.			
2.3	Explain critical thinking.	Explain critical thinking				
2.4	Explain creative thinking.	Discuss creative thinking				
2.5	Explain Learning from failure.	Discuss Learning from failure				
2.6	Explain learning by observation.	Explain learning by observation				
2.7	Describe Passive listening.	Describe Passive and Active listening				
2.8	Describe Active listening.	Explain lecture note taking techniques				
2.9	Explain Lecture note taking techniques.	Discuss techniques of reading fast with understanding				
2.10	Explain techniques of reading fast with understanding.	Discuss mental concentration and ways of increasing mental concentration				
2.11	Explain mental concentration and ways of increasing mental concentration.	Explain how to revise for examination				
2.12	Explain how to revise for examination.	Explain how to answer examination questions				
2.13	Explain how to answer examination questions.					

	2.14 Explain examination tension and ways to handle it.	• Explain examination tension and ways to handle it				
General Objective 3.0: Understand the essentials of time management						
5-6	3.1 Explain the importance of time management. 3.2 Explain how to do personal time survey. 3.3 Describe daily schedules. 3.4 Explain the formula for study hour. 3.5 Explain time management tips.	• Discuss the importance of time management • Draw up daily schedules with the students • Describe the formula for study hour • List and discuss time management tips	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Artificial Intelligence (AI), etc.	• Carry out personal time survey • Guide the students to do personal time survey • Draw up daily schedules for time management	Guide students to: • Carry out personal time survey • Guide the students to do personal time survey • Draw up daily schedules for time management	Notepads, AI tools.
General Objective 4.0: Know the self-control and leadership skills						
7-8	4.1 Explain bad habits and list common bad habits. 4.2 Explain ways of overcoming bad habits. 4.3 Explain ways of overcoming addictions – drugs, social media, pornography etc. 4.4 Explain leadership styles.	• Discuss common bad habits • Describe ways of overcoming bad habits • Discuss ways of overcoming addictions – drugs, social media, pornography etc. • Describe leadership styles • Discuss how to	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Artificial Intelligence (AI), etc.			

	4.5 Explain how to identify individual leadership styles. 4.6 Explain planning and organizing skills. 4.7 Explain delegation in leadership. 4.8 Explain risk assessment and management. 4.9 Explain change management. 4.10 Explain conflict resolution.	identify individual leadership styles • Explain planning and organizing skills • Discuss delegation in leadership • Describe risk assessment and management • Discuss change management • Discuss conflict resolution				
General Objectives 5.0: Understand personal health						
9-10	5.1 Explain types of health. 5.2 Explain the relationship between physical, mental and emotional health. 5.3 Define stress. 5.4 List common stress indicators. 5.5 Describe tips for reducing stress. 5.6 Define depression. 5.7 Outline signs of depression. 5.8 Explain how to	• Describe types of health: Physical, Mental and Emotional health. • Explain the relationship between physical, mental and emotional health • Explain stress • Discuss common stress indicators • Describe tips for reducing stress • Explain depression • Discuss signs of	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Artificial Intelligence (AI), etc.			

	overcome depression.	depression • Discuss how to overcome depression				
General Objectives 6.0: Know manners and etiquettes						
11-12	6.1 Define manners. 6.2 Define etiquette. 6.3 Explain the importance of etiquette. 6.4 Explain types of etiquette. 6.5 Outline the common rules of etiquette. 6.6 Explain moral values. 6.7 Explain the importance of moral values in society.	• Explain manners • Explain etiquette • Discuss the importance of etiquette • Discuss types of etiquette • Discuss the common rules of etiquette • Explain moral values • Discuss the importance of moral values in society	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Artificial Intelligence (AI), etc.			
General Objectives 7.0: Understand personal financial management						
13-15	7.1 Explain the difference between needs and wants. 7.2 Explain how to do personal budget as student. 7.3 Explain how to save money as student. 7.4 Explain the	• Discuss the difference between needs and wants • Discuss how to do personal budget as student • Explain how to save money as student	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia	• Carry out personal budget preparation in groups using a certain amount of money	• Guide students to prepare personal budget preparation in groups using a certain	Notepads, AI tools.

	advantages and disadvantages of electronic banking. 7.5 Explain identity theft and how to avoid it.	• Explain the advantages and disadvantages of electronic banking • Discuss identity theft and how to avoid it	Projector, Artificial Intelligence (AI), etc.		amount of money	
COURSE ASSESSMENT COURSE WORK (PRACTICAL BASED): 10% TESTS (PRACTICAL BASED): 10% PRACTICAL: 40% EXAMINATION (THEORY AND PRACTICAL): 40% TOTAL: 100%						





FISH FARM MANAGEMENT

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: FISH FARM MANAGEMENT	COURSE CODE: FIT 121	CONTACT HOURS: 3HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2HOURS/WEEK
GOAL: This course is designed to equip students to acquire fundamental knowledge and skills in fish farming operations and aquaculture management		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the principles, scope, and importance of fish farming in sustainable aquaculture development. 2.0 Know and utilize appropriate fish farm facilities, tools, equipment, and production systems used in modern aquaculture operations. 3.0 Apply practical techniques in fishpond construction, preparation, and maintenance for effective fish production. 4.0 Understand competence in fish seed selection, breeding, stocking, and nursery management practices. 5.0 Apply appropriate feeding, water quality management, and fish health management techniques in fish farming operations. 6.0 Apply Fish Health, Biosecurity, and Farm Record Management Practices. 7.0 Understand personnel and resource management skills.		

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY						
COURSE TITLE: FISH FARM MANAGEMENT		COURSE CODE: FIT 121		CONTACT HOURS: 3HOURS/WEEK		
		CREDIT UNIT: 3		THEORETICAL: 1HOUR/WEEK		
YEAR: I SEMESTER: II		PRE-REQUISITE:		PRACTICAL: 2HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students to acquire fundamental knowledge and skills in fish farming operations and aquaculture management						
GENERAL OBJECTIVE 1.0: Understand the principles, scope, and importance of fish farming in sustainable aquaculture development						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1-2	1.1 Explain the meaning of fish farming. 1.2 Explain the scope of fish farming. 1.3 Explain the importance of fish farming. 1.4 Describe the history and development of aquaculture. 1.5 Explain the principles of sustainable aquaculture development. 1.6 Describe major fish farming systems. 1.7 Explain the economic importance of fish farming.	• Discuss the meaning of fish farming • Discuss the scope of fish farming. • Explain the importance of fish farming • Discuss the history and development of aquaculture • Explain the principles of sustainable aquaculture development • Discuss major fish farming systems • Explain the	Whiteboard, lecture notes, Projector, Fisheries textbooks, Charts, Marker board, Journals, Instructional materials, etc.	• Identify different fish farming activities and operations. • Identify common aquaculture practices in the locality. • Demonstrate sustainable fish farming practices • Differentiate fish farming systems practically • Assess economic activities carried out in fish farms.	Guide students to: • Observe fish farm operations • Organize field observation of nearby fish farming practices. • observe eco-friendly fish farming systems. • Demonstrate the characteristics of different fish farming systems.	Fish ponds, Fish farm facilities, Note pads, Fish farms, Cameras, CCTV camera, Water supply systems, Waste disposal.

		economic importance of fish farming.			Identify fish farm income-generating activities.	
General Objective 2.0: Know and utilize appropriate fish farm facilities, tools, equipment, and production systems used in modern aquaculture operations.						
3-4	2.1 Explain the importance of fish farm facilities and equipment in aquaculture operations. 2.2 Describe different fish production systems. 2.3 Explain the functions of fishponds and culture units. 2.4 Explain fish farm site facilities and layout. 2.5 Describe water supply and drainage systems in aquaculture	- Discuss fish farm facilities, tools, and equipment used in modern aquaculture. - Explain extensive, semi-intensive, and intensive aquaculture systems. - Discuss earthen ponds, concrete ponds, plastic tanks, cages, and raceways. - Discuss the arrangement of water supply, drainage, storage, and hatchery units. - Discuss sources of water and drainage management systems.	Whiteboard, lecture notes, Projector, Fisheries textbooks, Charts, Marker board, Journals, Instructional materials, etc.	- Identify common fish farm facilities and equipment - Differentiate various fish production systems practically. - Assess different fish culture units. - Design simple fish farm layouts. - Operate water supply facilities.	Guide students to: - Identify fish farm structures and tools. - Demonstrate the operational features of each production system. - Organize practical visits to fish culture facilities. - Demonstrate practical fish farm planning techniques. - Demonstrate water inlet and outlet management.	Fishponds, Tanks, Nets, Buckets, Earthen ponds, Concrete ponds, Cages, Raceways. Sample farm plans. Water pump, Drainage channels.
General Objective 3.0: Apply practical techniques in fishpond construction, preparation, and maintenance for effective fish						

production.						
5-6	3.1 Explain the principles of fishpond construction in aquaculture. 3.2 Explain the importance of fishpond construction in aquaculture. 3.3 Describe factors considered in fishpond site selection. 3.4 Explain different fishpond construction methods. 3.5 Explain pond layout and design principles. 3.6 Explain pond excavation and embankment construction.	• Discuss fishpond construction concepts • Discuss its importance of fishpond construction in aquaculture. • Explain soil type, water supply, topography, and accessibility requirements. • Discuss construction procedures for earthen, concrete, and plastic ponds. • Discuss pond dimensions, dikes, drainage, and water inlet systems. • Discuss excavation techniques and pond wall construction.	Whiteboard, lecture notes, Projector, Fisheries textbooks, Charts, Marker board, Journals, Instructional materials, etc.	• Identify different types of fishponds. • Assess potential fishpond sites using standard criteria. • Identify materials used in pond construction. • Design simple fishpond layouts. • Participate in simple pond excavation activities.	Guide students to: • Identify pond structures and features. • Demonstrate practical site inspection procedures. • Demonstrate the use of construction materials and tools. • Guide students in preparing pond layout sketches. • Demonstrate excavation and embankment procedures.	Earthen ponds, Concrete ponds, Plastic tanks, Measuring tapes, Soil samples, Water sources. Cement, Sand, Pipes, Wheelbarrows, Shovels. Rulers, Drawing materials. Hoes, Diggers.
General Objective 4.0: Demonstrate competence in fish seed selection, breeding, stocking, and nursery management practices						

7-8	4.1 Explain the importance of fish seed selection in aquaculture. 4.2 Explain the importance of nursery management in aquaculture. 4.3 Describe the characteristics of good quality fish seeds. 4.4 Explain fish breeding principles in aquaculture. 4.5 Explain broodstock selection and management. 4.6 Explain fish spawning techniques.	• Discuss fish seed production concepts and discuss their role in fish farming success. • Explain healthy seed traits such as size uniformity, active movement, and disease-free appearance. • Discuss natural and artificial breeding methods. • Discuss criteria for selecting and managing broodstock fish. • Discuss induced breeding, spawning conditions, and breeding procedures.	Whiteboard, lecture notes, projector, fisheries Charts, Fish seed samples, instructional materials. Breeding manuals, multimedia presentations Charts, Hatchery guides, Hormone samples, etc.	• Identify different types of fish seeds used in aquaculture. • Sort healthy and unhealthy fish seeds. • Identify male and female broodstock fish. • Identify suitable broodstock for breeding purposes. • Carry out simple fish spawning procedures.	Guide students to: • Identify fish seeds • Demonstrate practical fish seed examination techniques. • Demonstrate sex differentiation in broodstock fish. • Guide students in broodstock handling and selection. • Demonstrate induced breeding techniques.	Fish fry, Fingerlings, Fish tanks, Fish seed samples, Bowls, Magnifying lenses. Broodstock fish, Breeding tanks, Gloves, Broodstock ponds, Weighing scales, Nets. Syringes, Hormone solutions.
General Objective 5.0: Apply appropriate feeding, water quality management, and fish health management techniques in fish farming operations.						

9-10	5.1 Explain the importance of feeding, water quality, and fish health management in aquaculture. 5.2 Describe different types of fish feeds and feeding methods. 5.3 Explain nutrient requirements of cultured fish species. 5.4 Explain feeding management practices in fish farming. 5.5 Explain feed storage and handling procedures.	• Discuss feeding practices, water management, and fish health concepts in fish farming. • Explain natural and artificial feeds, feeding schedules, and feeding techniques. • Discuss proteins, carbohydrates, fats, vitamins, and minerals required by fish. • Discuss feeding frequency, feed conversion ratio, and feed utilization methods. • Discuss methods of feed preservation and prevention of feed spoilage.	Whiteboard, lecture notes, projector, fisheries Charts, Fish seed samples, instructional materials. Breeding manuals, multimedia presentations . Charts, Hatchery guides, Hormone samples, etc.	• Identify common fish feeds and water management tools. • Identify and classify fish feeds used in aquaculture. • Calculate simple feeding rates for fish. • Carry out practical fish feeding activities. • Store fish feeds using standard procedures.	• Guide students to: • Observe feeds and water management equipment. • Demonstrate handling and identification of fish feeds. • Guide students in feed ration calculations. • Demonstrate proper feeding techniques and schedules. • Demonstrate feed storage and handling techniques.	Fish feeds, Water testing kits, Fishponds. Fish feed samples, Feeding trays, Storage containers. Calculators, Fish feed tables, Worksheets. Feed storage containers, Shelves, pallets.
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General Objective 6.0: Apply fish health, biosecurity, and farm record management practices.						
11-12	6.1 Explain the importance of fish health, biosecurity, and farm record management in aquaculture. 6.2 Describe common fish diseases and causes. 6.3 Explain fish disease prevention and control measures. 6.4 Explain principles of biosecurity in aquaculture operations. 6.5 Explain water quality management and its relationship to fish health. 6.6 Explain stress management in fish farming operations.	• Discuss concepts of fish health management, biosecurity, and record keeping. • Discuss bacterial, fungal, viral, and parasitic diseases affecting fish. • Discuss sanitation, quarantine, vaccination, and treatment procedures. • Discuss farm hygiene, movement control, and disease monitoring systems.	Whiteboard, lecture notes, projector, fisheries Charts, Fish seed samples, instructional materials. Breeding manuals, multimedia presentations Charts, Hatchery guides, Hormone samples.	• Identify fish health and farm record management materials. • Identify signs and symptoms of fish diseases. • Apply disease prevention and treatment techniques. • Implement practical biosecurity measures on fish farms.	• Guide students to; • identify fish health tools and record books. • Demonstrate fish health inspection procedures. • Demonstrate pond sanitation and fish treatment methods. • Carry out sanitation and disinfection exercises.	Record books, Fish ponds, Fish samples. Diseased fish samples, Gloves, Magnifying lenses. Disinfectants , treatment chemicals, PPE Footbaths.

General Objective 7.0: Demonstrate personnel and resource management skills.						
13-15	7.1 Explain the meaning of personnel and resource management in fisheries operations. 7.2 Explain the importance of personnel and resource management in fisheries operations. 7.3 Describe organizational structure and chain of command in fisheries enterprises. 7.4 Explain principles of effective communication and leadership in workplace management. 7.5 Explain types of resources used in fisheries and aquaculture operations. 7.6 Explain methods of resource allocation and utilization.	• Discuss concepts of personnel management, teamwork, and resource utilization through lecture and discussion. • Explain organizational hierarchy and communication channels using diagrams and case studies. • Discuss communication methods, leadership styles, and conflict resolution techniques. • Explain human, financial, material, and natural resources used in fisheries management. • Describe procedures for planning and allocating resources efficiently	Whiteboard, lecture notes, projector, fisheries Charts, Fish seed samples, instructional materials. Breeding manuals, multimedia presentations . Charts, Hatchery guides, Hormone samples.	• Identify personnel roles and available resources in a fish farm or fisheries enterprise. • Prepare a simple organizational chart for a fisheries business. • Demonstrate communication and leadership skills during group activities. • Record resources available in a fish farm. • Allocate resources for a simple fish production activity.	• Guide students to; • Observe and list farm personnel duties and available resources. • Demonstrate preparation of organizational structure and supervise group activity. • Organize role play and teamwork exercises. • Guide students in resource identification and inventory preparation. • Demonstrate practical resource planning and supervision.	Fish farm facility, Worksheets, Observation checklist, Drawing materials, Computer system, Sample templates Role-play materials, Fish farm tools, Farm inventory sheets, Plan sheets, Calculators.

COURSE ASSESSMENT

COURSE WORK (PRACTICAL BASED): 10%

TESTS (PRACTICAL BASED): 10%

PRACTICAL: 40%

EXAMINATION (THEORY AND PRACTICAL): 40%

TOTAL: 100%



BIOLOGY OF FISHES

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: BIOLOGY OF FISHES	COURSE CODE: FIT 122	CONTACT HOURS: 4HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills of fish structure, functions, classification, ecology, and life processes		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the scope and importance of fish biology; 2.0 Understand fish classification into major taxonomic groups; 3.0 Know the morphology and external features of fish; 4.0 Know the internal anatomy of fish; 5.0 Understand physiological processes in fish; 6.0 Understand feeding and feeding strategies in fishes; 7.0 Understand fish reproduction, growth, and development; 8.0 Know fish ecology and behavior.		

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY						
COURSE TITLE: BIOLOGY OF FISHES		COURSE CODE: FIT 122		CONTACT HOURS: 4HOURS/WEEK		
		CREDIT UNIT: 4		THEORETICAL: 1 HOUR/WEEK		
YEAR: I SEMESTER: II		PRE-REQUISITE:		PRACTICAL: 3 HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills of fish structure, functions, classification, ecology, and life processes						
GENERAL OBJECTIVE 1.0: Understand the scope and importance of fish biology						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1	1.1 Define fish biology. 1.2 Explain the scope of fish biology. 1.3 Explain the importance of fish in human nutrition and economy. 1.4 Describe the general characteristics of fish. 1.5 Explain the distinction between fish and other aquatic organisms.	• Discuss fish biology • Discuss the scope of fish biology • Explain the importance of fish in human nutrition and economy • Explain the general characteristics of fish. • Discuss the distinction between fish and other aquatic organisms	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.			
General Objective 2.0: Understand fish classification into major taxonomic groups						

2-3	2.1 Explain the principles of taxonomy. 2.2 Explain the scientific naming of organisms. 2.3 Describe the major classes of fishes.	• Discuss the principles of taxonomy • Explain the scientific naming of organisms (binomial nomenclature) • Discuss the major classes of fishes: ➤ Agnatha (jawless fishes) ➤ Chondrichthyes (cartilaginous fishes) ➤ Osteichthyes (bony fishes)	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Sketch well labelled examples of major classes of fish • Identify common Nigerian fish species	Guide student to: • Sketch and label examples of major classes of fish • Identify common Nigerian fish species	Fish specimens, Charts, Video clips, Fish guide.
General Objective 3.0: Know the morphology and external features of fish						

4-5	3.1 Describe the external features of Tilapia and Catfish. 3.2 Explain morphometric and meristic measurements in fishes. 3.3 Describe various body shape and symmetry. 3.4 Describe various fins. 3.5 Describe various scales. 3.6 Describe fish skin and coloration.	• Explain the external features of Tilapia and Catfish • Discuss morphometric and meristic measurements in fishes • Discuss various body shape and symmetry • Explain various fins: types, structure, and functions • Discuss various scales: cycloid, ctenoid, ganoid, placoid • Explain fish skin and coloration	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Sketch well labelled the external features of Tilapia and Catfish • Conduct morphometric and meristic measurements in fishes • Identify various fins • Identify cycloid, ctenoid, ganoid, placoid scales	Guide the students to: • Sketch and label the external features of Tilapia and Catfish • Conduct morphometric and meristic measurements in fishes • Identify various fins • Identify cycloid, ctenoid, ganoid, placoid scales	Different species of fish, Hand lens, Measuring board Fish guide.
General Objective 4.0: Know the internal anatomy of fish						

6-7	4.1 Describe the fish skeletal system. 4.2 Describe the muscular system of fish. 4.3 Describe the various types of digestive system in fish. 4.4 Explain the circulatory system in fish. 4.5 Explain the nervous system in fish. 4.6 Explain the excretory system of fish. 4.7 Explain the respiratory organs of fish.	• Explain the fish skeletal system (axial and appendicular) • Discuss the muscular system of fish • Discuss the various types of digestive system in fish • Explain the circulatory system in fish • Discuss the nervous system in fish • Explain the excretory system of fish • Discuss the respiratory organs of fish	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Dissect the internal organs of fish • Identify the internal organs of fish • Dissect digestive system of fish • Identify digestive systems of fish • Dissect the respiratory organs of fish • Identify the respiratory organs of fish	Guide students to: • Dissect the internal organs of fish • Identify the internal organs of fish • Dissect digestive system of fish • Identify digestive systems of fish • Dissect the respiratory organs of fish • Identify the respiratory organs of fish	Different species of fish, Hand lens, Measuring board, Dissecting set, Dissecting board, Hand gloves, Fish guide
General Objective 5.0: Understand physiological processes in fish.						
8-9	5.1 Explain respiration. 5.2 Describe air-breathing organs in fishes.	• Discuss respiration (gill structure and function) • Explain air-	Textbooks, Encyclopedia, E-books, Journals, Magazines,	• Dissect various part of fish gill • Identify various parts of fish gill	Guide students to: • Dissect various part	Fresh fish, Dissecting set, Dissecting board, Hand gloves.

	5.3 Describe osmoregulation in freshwater and marine fishes. 5.4 Explain thermoregulation and metabolism in fishes. 5.5 Explain circulation and heart function in fishes. 5.6 Describe sensory organs and their function in fishes.	breathing organs in fishes • Discuss in freshwater and marine fishes • Explain thermoregulation and metabolism in fishes • Explain circulation and heart function in fishes • Discuss sensory organs and their function in fishes	Video clips, Charts, Marker, Multimedia Projector, etc	• Dissect various air-breathing organs in fishes • Identify various air-breathing organs in fishes • Dissect fish heart and major blood vessels of fish • Identify fish heart and major blood vessels of fish	of fish gill • Identify various parts of fish gill • Dissect various air-breathing organs in fishes • Identify various air-breathing organs in fishes • Dissect fish heart and major blood vessels of fish • Identify fish heart and major blood vessels of fish	Different species of fish, Hand lens, Measuring board, Fish guide.
General Objective 6.0: Understand feeding and feeding strategies in fishes						
10-11	6.1 Describe the different modes of feeding in fish.	• Discuss the different modes of feeding in fish e.g.	Textbooks, Encyclopedia, E-books,	• Identify the digestive system of herbivorous,	Guide students to: • Identify the digestive	Fresh fish, Dissecting set, Dissecting

	6.2 Explain the adaptations of fish to different feeding methods. 6.3 Explain feeding strategies in fishes.	of filter feeding, omnivorous, carnivorous, detritus feeding etc. - Discuss the adaptations of fish (morphological adaptations) to different feeding methods. - Explain feeding strategies in fishes	Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc	carnivorous and omnivorous fishes. - Identify herbivorous, carnivorous and omnivorous fishes using fish teeth. - Carry out fish stomach content analysis.	system of herbivorous, carnivorous and omnivorous fishes - Identify herbivorous, carnivorous and omnivorous fishes using fish teeth - Carryout fish stomach content analysis	board, Hand gloves. Different species of fish, Hand lens, Measuring board, Fish guide.
General Objective 7.0: Understand fish reproduction, growth, and development						
12-14	7.1 Explain types of reproduction in fishes. 7.2 Explain mode of reproduction in fishes. 7.3 Describe male and female reproductive systems. 7.4 Explain fecundity	- Discuss types of reproduction in fishes (bisexual, hermaphrodite and parthenogenesis) - Explain mode of reproduction in fishes (oviparous, viviparous and ovoviviparous)	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	- Identify fish reproductive organs and maturity stages - Carry out fecundity analysis - Measure length and weight of fishes to plot	Guide student to: - Identify fish reproductive organs and maturity stages - Carry out fecundity analysis - Measure	Fresh fish, Dissecting set, dissecting board, Weighing balance, Measuring board, Scales, Otoliths, Microscope.

	and its importance. 7.5 Describe spawning behavior and parental care in fishes. 7.6 Explain growth patterns in fishes. 7.7 Explain factors affecting growth in fishes. 7.8 Describe age determination methods in fishes.	- Describe male and female reproductive systems - Explain fecundity and its importance - Describe spawning behavior and parental care in fishes - Explain growth patterns (isometric and allometric) in fishes - Explain factors affecting growth in fishes - Explain age determination methods (scales, otoliths) in fishes		length-weight relationship and determine their condition factor Carry out age determination using scales and otoliths	length and weight of fishes to plot length-weight relationship and determine their condition factor Carry out age determination using scales and otoliths	
General Objective 8.0: Know fish ecology and behavior						
15	8.1 Explain behavioural responses in fish. 8.2 Explain fish migration and factor influencing migration 8.3 Describe types of fish migration	Discuss behavioural responses in fish e.g. aggregation schools, shoals, aestivation and hibernation.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker,			

		• Discuss fish migration and factor influencing migration • Describe types of fish migration e.g. anadromous, catadromous, etc	Multimedia Projector, etc.		
COURSE ASSESSMENT COURSE WORK (PRACTICAL BASED): 10% TESTS (PRACTICAL BASED): 10% PRACTICAL: 40% EXAMINATION (THEORY AND PRACTICAL): 40% TOTAL: 100%					

INTRODUCTION TO AQUACULTURE

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: INTRODUCTION TO AQUACULTURE	COURSE CODE: FIT 123	CONTACT HOURS: 3 HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2 HOURS/WEEK
GOAL: This is designed to acquaint students with knowledge and skills in basic aquaculture		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand scope of aquaculture; 2.0 Know major aquaculture species; 3.0 Know different aquaculture systems and culture methods; 4.0 Know fishpond preparation for stocking purposes; 5.0 Know the role of natural fish food and supplementary feeding in ponds; 6.0 Understand the harvesting, transportation and marketing of fish.		

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY						
COURSE TITLE: INTRODUCTION TO AQUACULTURE		COURSE CODE: FIT 123		CONTACT HOURS: 3 HOURS/WEEK		
		CREDIT UNIT: 3		THEORETICAL: 1 HOUR/WEEK		
YEAR: I SEMESTER: II		PRE-REQUISITE:		PRACTICAL: 2 HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This is designed to acquaint students with knowledge and skills in basic aquaculture						
GENERAL OBJECTIVE 1.0: Understand scope of aquaculture.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1	1.1 Define aquaculture and its scope. 1.2 Explain the history of aquaculture in Nigeria. 1.3 Explain the potential of aquaculture in boosting fish production in Nigeria. 1.4 Explain the potential of aquaculture in boosting fish production in Nigeria. 1.5 Describe aquaculture	• Discuss aquaculture and its scope • Discuss the history of aquaculture in Nigeria • Discuss the potential of aquaculture in boosting fish production in Nigeria. • Discuss the potential of aquaculture in boosting fish production in Nigeria. • Discuss pond, tank,	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.			

	systems.	cage culture systems				
General Objective 2.0: Know major aquaculture species.						
2-3	2.1 Explain major fish species in Nigeria. 2.2 Describe the characteristics of a culturable fish. 2.3 Describe major culturable fishes in Nigeria. 2.4 Explain fish seed, table fish, ornamental fish, shellfish.	• Discuss major fish species in Nigeria • Discuss the characteristics of a culturable fish • Describe major culturable fishes in Nigeria • Explain fish seed, table fish, ornamental fish, shellfish	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Identify major fish types in Nigeria, fish seed, table fish, ornamental fish, shellfish • Draw different cultivable fish species.	Guide students to: • Identify major fish types in Nigeria, • Draw different cultivable fish species.	Charts, Fish museum.
General Objective 3.0: Know different aquaculture systems and culture methods						
4-6	3.1 Explain extensive, semi-intensive and intensive farming systems. 3.2 Explain monoculture, polyculture, integrated aquaculture. 3.3 Describe aquaculture facilities and their uses.	• Discuss extensive, semi-intensive and intensive farming systems • Explain monoculture, polyculture, integrated aquaculture • Describe aquaculture facilities and their uses	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Identify aquaculture systems. • Identify aquaculture facilities.	Guide students to: • Identify aquaculture systems • Identify aquaculture facilities	Earthen pond, Hatchery tanks, Concrete pond, Collapsible tank, Fish cages, Vats.
General Objective 4.0: Know fishpond preparation for stocking						

7-9	4.1 Explain the need for preparing earthen pond bottoms in old and new ponds before stocking. 4.2 Explain the use of liming material to condition pond bottoms. 4.3 Explain the processes involved in impounding water in ponds. 4.4 Explain fertilization in earthen ponds. 4.5 List different types of fertilizer. 4.6 Explain the principles of stocking ponds with desired species in monoculture and polyculture systems. 4.7 Explain site selection basics. 4.8 Explain environmental impacts. 4.9 Explain basic farm	• Discuss the need for preparing pond bottoms in old and new ponds before stocking. • Describe the use of liming material to condition pond bottoms • Explain the processes involved in impounding water in ponds • Discuss the need for fertilization. • Discuss inorganic fertilizers. • Explain the principles of stocking ponds with desired species in monoculture, and polyculture systems. • Discuss site selection basics • Discuss environmental impacts • Discuss basic	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc	• Identify fertilizers, manure and lime physically.	Guide the students to: • Identify fertilizers, manure and lime physically.	Concrete pond, Fertilizer, Lime,
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	structures.	farm structures				
General Objective 5.0: Know the role of natural fish food and supplementary feeding in ponds						
10-12	5.1 List the methods available to produce natural fish food. 5.2 Explain locally available common fish feedstuff. 5.3 Describe the procedure for compounding simple fish feed. 5.4 Explain production and packaging of fish feed pellets. 5.5 Explain how to estimate the quantity of supplementary feed to be applied to experimental pond.	• Discuss the methods available to produce natural fish food. • Explain locally available common fish feedstuff. • Describe the procedure for compounding simple fish feed. • Explain production and packaging of fish feed pellets • Explain how to estimate the quantity of supplementary feed to be applied to experimental pond	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Carry out production of natural live fish food. • Identify locally available feedstuff.	Guide students to: • Carryout production of natural live fish food • Identify locally available feedstuff	Stocked pond, Fish feed, Chart, Video clips
General Objective 6.0: Understand the harvesting, transportation and marketing of fish						
13-15	6.1 Explain fish harvesting. 6.2 List common methods of harvesting fish.	• Discuss fish harvesting. • Discuss common methods of harvesting fish	Textbooks, Encyclopedia, E-books, Journals, Magazines,	• Describe different ways of harvesting fish • Identify	Guide students to: • Identify different ways of harvesting fish • Identify	Drag nets, Scoop nets, Basins, Buckets, Fish

	6.3 Explain total and partial cropping. 6.4 Explain various methods of transporting harvested fish. 6.5 Explain the precautions required in transporting fish. 6.6 Explain the outlets for marketing fish-seed, table fish, shellfish, ornamental fish etc.	• Discuss total and partial cropping. • Discuss various methods of transporting harvested fish (live or dead). • Discuss the precautions required in transporting fish. • Discuss the outlets for marketing fish-seed, table fish, shellfish, ornamental fish etc.	Video clips, Charts, Marker, Multimedia Projector, etc.	equipment used for harvesting fish by (a) Partial (b) Total cropping	equipment used for harvesting fish by (a) Partial (b) Total cropping	transportation equipment, Gas bag, Plastic bowls, Jerry cans etc.
COURSE ASSESSMENT COURSE WORK (PRACTICAL BASED): 10% TESTS (PRACTICAL BASED): 10% PRACTICAL: 40% EXAMINATION (THEORY AND PRACTICAL): 40% TOTAL: 100%						

FISHING GEAR AND CRAFT TECHNOLOGY I

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: FISHING GEAR AND CRAFT TECHNOLOGY I	COURSE CODE: FIT 124	CONTACT HOURS: 4HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 3HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills of basic principle of designing, constructing and use of common fishing gear and crafts in Nigeria		
GENERAL OBJECTIVES: At the end of the course, the students should be able to: 1.0 Know the various classifications of fishing gear; 2.0 Understand netting materials for gear construction; 3.0 Know the basic process of net construction; 4.0 Know different types of fishing boat/craft.		

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY						
COURSE TITLE: FISHING GEAR AND CRAFT TECHNOLOGY I		COURSE CODE: FIT 124		CONTACT HOURS: 4HOURS/WEEK		
		CREDIT UNIT: 4		THEORETICAL: 1HOUR/WEEK		
YEAR: I SEMESTER: II		PRE-REQUISITE:		PRACTICAL: 3HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills of basic principle of designing, constructing and use of common fishing gear and crafts in Nigeria						
GENERAL OBJECTIVE 1.0: Know the various classifications of fishing gear						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1-2	1.1 Explain various classes of fishing gear. 1.2 Describe the active gears. 1.3 Describe the passive gears.	• Discuss various classes of fishing gear • Explain the active gears • Explain the passive gears	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Identify many traditional fishing gear • Identify many modern fishing gear	Guide students to: • Identify traditional fishing gear • Identify modern fishing gear	Netting, Nets, Hook and line, Pole and line, Spear, Lift net, Cast net, Beach seine net, Trawl net, Fyke net, Traps, Clap net, Scoop net, Angling.

General Objective 2.0: Understand netting materials for gear construction						
3-7	2.1 Explain various sources of fiber materials. 2.2 Explain the source of each fiber. 2.3 Explain the strengths and weaknesses of each.	- Discuss various sources of fiber materials - Explain the source of each fiber - Discuss the strengths and weaknesses of each	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	- Identify type of fibers material - Use some natural fiber materials - Identify natural fibers and synthetic fibers - Carry out identification test on the synthetic fiber - water, fire, texture etc. tests	Guide students to: - Identify type of fibers material - Produce some natural fiber - Identify natural fibers and synthetic fibers - Carry out identification test on the synthetic fiber -- water, fire, texture etc. tests	Manila rope, Sisal rope, Polyamide kuralon rope, Polyester rope, Polyethylene rope, Polyvinyl alcohol.
General Objective 3.0: Know the basic process of net construction						
8-10	3.1 Explain different terms associated with net construction. 3.2 Describe the process of net construction. 3.3 Define hanging ratio. 3.4 Explain the effects of hanging ratio on the shape of net.	- Explain different terms associated with net construction - Describe the process of net construction - Define hanging ratio - Explain the effects of hanging ratio on the shape of net	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	- Cut netting into required shape - Join netting together - Attach netting to rope	Guide students to: - Cut netting into required shape - Join netting together - Attach netting to rope	Netting, Rope, Knife, Fisherman needle, Twine.

General Objective 4.0: Know the different types of fishing boat/craft						
11-15	4.1 Describe a typical fishing craft. 4.2 Explain the classification of fishing boats according to their operation. 4.3 Explain the classification of fishing boats according to materials for construction. 4.4 Differentiate between mechanized and non-mechanized boat. 4.5 Describe simple tools for boat construction.	Describe a typical fishing craft Explain the classification of fishing boats according to their operation Explain the classification of fishing boats according to materials for construction Differentiate between mechanized and non-mechanized boat Describe simple tools for boat construction	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Visit a boat construction yard and identify different types of fishing craft • Construct a model boat using friendly materials.	Guide students to: • Identify different types of fishing craft in a boat construction yard • Construct a model boat using friendly materials.	Charts, Video clips, Small log, Planks, Styrofoam, Petrol, Mold, Band saw, Hammer, Nails, Woodwork Toolbox
COURSE ASSESSMENT COURSE WORK (PRACTICAL BASED): 10% TESTS (PRACTICAL BASED): 10% PRACTICAL: 40% EXAMINATION (THEORY AND PRACTICAL): 40% TOTAL: 100%						

ELEMENTS OF NAVIGATION AND SEAMANSHIP

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: ELEMENTS OF NAVIGATION AND SEAMANSHIP	COURSE CODE: FIT 125	CONTACT HOURS: 4HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL:3HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills required for safe boat operations, navigation and seamanship		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know the principles and importance of seamanship; 2.0 Know rope work and knot tying techniques; 3.0 Apply principles of navigation and chart reading; 4.0 Know navigational instruments 5.0 Interpret basic weather and sea conditions; 6.0 Operate small fishing vessels safely; 7.0 Know the rules and regulations guiding water transport and fishing operations; 8.0 Apply maritime safety and emergency procedures; 9.0 Know maintenance practices for boats and equipment.		

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY						
COURSE TITLE: ELEMENTS OF NAVIGATION AND SEAMANSHIP			COURSE CODE: FIT 125		CONTACT HOURS: 4HOURS/WEEK	
			CREDIT UNIT: 4		THEORETICAL: 1HOUR/WEEK	
YEAR: I SEMESTER: II			PRE-REQUISITE:		PRACTICAL:3HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills required for safe boat operations, navigation and seamanship						
GENERAL OBJECTIVE 1.0: Know the principles and importance of seamanship						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1-2	1.1 Explain the meaning and importance of seamanship. 1.2 Explain different types of boats and vessel. 1.3 Describe parts of boat.	- Discuss concepts of seamanship and navigation - Explain classifications and uses of vessels - Explain structural components of a boat	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector	- Identify local fishing boat - Identify parts and types of fishing vessels and boat - Label parts of a vessel.	Guide students to: - Identify local fishing boat, - Identify parts and types of fishing vessels and boat - Label parts of a vessel.	Charts, Multimedia, Boat model Boat diagram
General Objective 2.0: Know rope work and knot tying techniques.						
3-4	2.1 Describe different types of knots. 2.2 Explain knot tying techniques. 2.3 Explain the uses of different knots. 2.4 Explain anchoring	- Discuss different types of knots - Discuss knot tying techniques - Discuss the uses of different knots	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts,	- Construct different marine knots types - Practice rope handling - Demonstrate anchoring	Guide the students to: - Construct different marine knots types - Practice rope handling	Cord, Rope, Knife, Anchor.

	and mooring procedures. 2.5 Describe maintenance of ropes and anchors. 2.6 Explain anchoring procedures and equipment use.	• Explain anchoring and mooring procedures • Describe maintenance of ropes and anchors • Explain anchoring procedures and equipment use	Marker, Multimedia Projector, etc.	techniques • Demonstrate rope handling techniques • Demonstrate coiling and handling methods	• Demonstrate anchoring techniques • Demonstrate rope handling techniques • Demonstrate coiling and handling methods	
General Objective 3.0: Apply principles of navigation and chart reading						
5-6	3.1 Explain navigation concepts and terminology. 3.2 Explain navigation terms and principles. 3.3 Explain use of magnetic compass. 3.4 Describe bearings and positions. 3.5 Explain chart reading and interpretation. 3.6 Explain positions on navigation charts.	• Discuss navigation concepts and terminology • Discuss navigation terms and principles. • Explain use of magnetic compass. • Describe bearings and positions • Explain chart reading and interpretation • Explain positions on navigation charts	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Identify cardinal points and directions • Solve navigation exercise • Interpret navigation charts • Plot positions on navigation charts • Plot coordinates on the chart • Demonstrate compass reading and adjustment	Guide students to: • Identify cardinal points and directions • Solve navigation exercise • Read charts • Interpret charts • Plot positions on navigation charts • Plot coordinates on the chart • Demonstrate compass reading and adjustment	Navigation charts, Magnetic compass, Charts and Protractors, Plotting instrument.

General Objective 4.0: Know navigational instruments						
7	4.1 Explain GPS and electronic navigation systems. 4.2 Explain modern navigational aids 4.3 Explain sonar, radar and buoys.	• Explain GPS and electronic navigation systems. • Explain modern navigational aids • Discuss sonar, radar and buoys.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector.	• Operate GPS equipment • Identify modern navigational aid	• Demonstrate operation of GPS devices.	GPS receivers, Navigation equipment.
General Objective 5.0: Interpret basic weather and sea conditions.						
8	5.1 Explain tides, currents and waves. 5.2 Describe weather conditions. 5.3 Describe weather forecasting basics.	• Discuss tides, currents and waves • Discuss weather conditions. • Describe weather forecasting basics.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Identify meteorological equipment • Record weather observation • Interpret weather conditions	Guide students to: • Identify meteorological equipment • Record weather observation • Interpret weather conditions	Weather monitoring instrument, Oceanographic equipment.
General Objective 6.0: Operate small fishing vessels						
9-10	6.1 Explain functions of vessel components. 6.2 Explain functions of hull, keel, rudder and propeller. 6.3 Describe safe fishing vessel	• Discuss functions of vessel components. • Discuss functions of hull, keel, rudder and propeller • Describe safe	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia	• Practice navigation and boat handling • Conduct safe fishing vessel operation	Guide students to: • Practice navigation and boat handling • Conduct safe fishing vessel operation	Boat, PPE.

	operation.	fishing vessel operation	Projector, etc.			
General Objective 7.0: Know the rules and regulations guiding water transport and fishing operations						
11	7.1 Explain rules and regulations guiding navigation. 7.2 Explain inland water regulations. 7.3 Explain the maritime laws.	• Explain rules and regulations guiding navigation • Discuss inland water regulations • Discuss the maritime laws	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Maritime regulations handbook			
General objective 8.0 Apply maritime safety and emergency procedures						
12-13	8.1 Explain maritime safety and emergency procedures. 8.2 Explain the importance of safety in fishing operations. 8.3 Describe common fishing hazards and risks. 8.4 Describe basic	• Discuss meaning and importance of safety practices in fisheries • Discuss physical, chemical, and environmental hazards • Discuss common fishing hazards and risks	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Carry out maritime safety procedures • Identify safety signs and protective equipment • Demonstrate use of PPE and safety signs • Demonstrate	Guide students to: • Carry out maritime safety procedures • Identify safety signs and protective equipment • Demonstrate use of PPE and safety signs	Life jackets and fire extinguishers, First Aid kits, PPE, Safety charts, Environmental charts.

	swimming strokes. 8.5 Describe basic free-diving techniques. 8.6 Explain water safety rules for swimming in pond, river, lakes and ocean. 8.7 Describe basic Cardiopulmonary Resuscitation (CPR) method.	- Describe basic swimming strokes - Discuss basic free-diving techniques - Discuss water safety rules for swimming in pond, river, lakes and ocean - Describe basic Cardiopulmonary Resuscitation (CPR) method		emergency response procedures such as cut, injuries, CPR, etc. - Participate in safety drills. - Conduct rescue and distress procedures - Recognize hazards in fishing environment - Identify hazards around fish farm/boat - Participate in swimming practice - Perform cleaning and maintenance of swimming pools or pond.	- Demonstrate emergency response procedures such as cut, injuries, CPR, etc. - Participate in safety drills. - Conduct rescue and distress procedures - Recognize hazards in fishing environment - Guide students to identify hazards around fish farm/boat - Participate in swimming practice - Demonstrate cleaning and maintenance procedures	
General Objective 9.0 Know maintenance practices for boats and equipment						
14-15	9.1 Explain maintenance of boats and engines.	Discuss maintenance of boats and engines	Textbooks, Encyclopedia, E-books,	Carry out maintenance under	Guide students to: Carry out maintenance	Maintenance tools

	9.2 Explain common engine faults. 9.3 Explain engine troubleshooting steps.	• Discuss common engine faults • Explain engine troubleshooting steps	Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	supervision. • Identify common engine faults • Troubleshoot common engine faults	practical • Identify common engine faults • Troubleshoot common engine faults	
COURSE ASSESSMENT COURSE WORK (PRACTICAL BASED): 10% TESTS (PRACTICAL BASED): 10% PRACTICAL: 40% EXAMINATION (THEORY AND PRACTICAL): 40% TOTAL: 100%						

INTRODUCTION TO FISHERIES STATISTICS AND COMPUTER APPLICATIONS

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: INTRODUCTION TO FISHERIES STATISTICS AND COMPUTER APPLICATIONS	COURSE CODE: FIT 126	CONTACT HOURS: 3HRS
	CREDIT UNIT: 3	THEORETICAL: 1HR
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 2HOUR/WEEK
GOAL: This course is designed to equip students with knowledge and skills in basic statistics and computer applications in fisheries		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the basic principles and applications of statistics in fisheries and aquaculture; 2.0 Understand how to collect, organize, analyze, and interpret fisheries data using appropriate statistical methods; 3.0 Know how to use spreadsheet and statistical software for fisheries operations; 4.0 Know how to apply analytical and problem-solving skills in fisheries-related practical activities.		

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY						
COURSE TITLE: FIT 126: INTRODUCTION TO FISHERIES STATISTICS AND COMPUTER APPLICATIONS		COURSE CODE: FIT 126		CONTACT HOURS: 3HOURS/WEEK		
		CREDIT UNIT: 3		THEORETICAL: 1HOUR/WEEK		
YEAR: I SEMESTER: II		PRE-REQUISITE:		PRACTICAL: 2HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills in basic statistics and computer applications in fisheries						
GENERAL OBJECTIVE 1.0: Understand the basic principles and applications of statistics in fisheries and aquaculture						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1-4	1.1 Explain the meaning and importance of statistics in fisheries and aquaculture. 1.2 Describe basic statistical terms used in fisheries studies. 1.3 Explain types and sources of fisheries data. 1.4 Describe methods of data collection in fisheries statistics. 1.5 Explain measures of central tendency in fisheries statistics. 1.6 Explain measures of dispersion in fisheries	- Discuss statistics and its relevance in fisheries production, management, and research. - Explain terms such as data, sample, population, variables, and frequency. - Discuss primary and secondary data sources in fisheries and aquaculture. - Explain	Whiteboard, lecture notes, Projector, Fisheries textbooks, Charts, Marker board, Journals, Questionnaire s, Instructional materials, Statistical tables, etc.	- Identify common fisheries data used in fisheries and aquaculture - Classify fisheries data into categories and groups - Calculate mean, median, and mode from fisheries data using computer software - Compute simple measures of dispersion from collected data	Guide students to; - Observe and identify fisheries records and data samples. - Demonstrate grouping and organization of fisheries data. - Demonstrate calculations using fisheries records.	Fish farm records, Worksheets, Sample data set, computers. Fish ponds, Weighing scales, Measuring instruments, Clipboards, Fish samples. E-book, Relevant statistical software.

	statistics.	observation, interview, questionnaire, and sampling methods. • Explain mean, median, and mode using fisheries examples. • Discuss range and simple variation in fisheries data. • Explain bar charts, pie charts, histograms, and line graphs.		using computer software		
General Objective 2.0: Understand how to collect, organize, analyze, and interpret fisheries data using appropriate statistical methods						
5-7	2.1 Explain the concept of fisheries data collection. 2.2 Explain the importance of fisheries data collection. 2.3 Describe sources of fisheries data. 2.4 Explain methods of organizing fisheries data. 2.5 Describe frequency distribution in fisheries statistics.	• Discuss fisheries data collection methods and their relevance in aquaculture management. • Discuss primary and secondary data sources in fisheries operations. • Explain classification, tabulation, and coding of data. • Explain grouped	Whiteboard, lecture notes, Projector, Fisheries textbooks, Charts, Marker board, Journals, Questionnaire s, Instructional materials, Statistical tables.	• Identify different types of fisheries data • Collect simple fisheries data from fish farm activities. • Organize collected fisheries data into tables. • Construct frequency distribution tables from	Guide students to; • Identify production, growth, feeding, and marketing data. • Demonstrate practical data collection procedure • Tabulating and arranging	Fish farm records, notebooks, sample data sheets. Fishponds, weighing scales, measuring tapes, record books. Worksheets, computers, graph sheets. Calculators,

		and ungrouped frequency distribution tables.		fisheries data using computer software	data systematically • Demonstrate the preparation of frequency tables.	worksheets, fisheries data records. Fish production records, calculators, spreadsheets.
General Objective 3.0: Know how to use spreadsheet and statistical software for fisheries operations.						
8-10	3.1 Explain the importance of spreadsheet and statistical software in fisheries operations. 3.2 Describe the features and functions of spreadsheet software. 3.3 Explain data entry procedures in spreadsheets. 3.4 Describe spreadsheet formatting tools.	• Describe spreadsheet and statistical software applications in fisheries management and research • Explain spreadsheet environment, rows, columns, cells, and worksheets. • Discuss methods of entering and editing fisheries data in spreadsheets. • Explain cell formatting, alignment,	Whiteboard, lecture notes, Projector, Fisheries textbooks, Charts, Marker board, Journals, Questionnaires, Instructional materials, Statistical tables, etc.	• Identify spreadsheet and statistical software packages used in fisheries operations. • Use spread sheet to open, create, and save files. • Enter fisheries production and management data into spreadsheets • Format fisheries datasets.	Guide students to: • Demonstrate the use of different software applications in fisheries data processing. • Create and save worksheets. • Demonstrate practical data entry procedures. • Supervise students during formatting exercises.	Computers, Microsoft Excel, Statistical software packages, Computers, spreadsheet software, Flash drives, sample data tables.

		borders, and table creation.				
General Objective 4.0: Know how to apply analytical and problem-solving skills in fisheries-related practical activities						
11-15	4.1 Explain analytical and problem-solving skills in fisheries operations. 4.2 Describe common production problems in fisheries and aquaculture. 4.3 Explain methods of data analysis in fisheries management. 4.4 Explain problem identification techniques in fisheries operations. 4.5 Explain the use of platforms such as AquaManager, eFishery, FiSAT and water quality data login. 4.6 Explain the use of GPS in fisheries.	• Discuss spreadsheet and statistical software applications in fisheries management and research. • Explain spreadsheet environment, rows, columns, cells, and worksheets. • Describe methods of entering and editing fisheries data in spreadsheets. • Explain cell formatting, alignment, borders, and table creation • Explain the use of platforms such as AquaManager, eFishery, FiSAT, water quality data login • Explain the use of GPS in fisheries	Whiteboard, lecture notes, Projector, Fisheries textbooks, Charts, Marker board, Journals, Questionnaires, Instructional materials, Statistical tables, etc.	• Carry out fisheries data management using the following software AquaManager, eFishery and FiSAT • Operate GPS in fish farm and other fisheries activities.	Guide students: • Carry out fisheries data management using the following software AquaManager, eFishery and FiSAT • Operate GPS in fish farm and other fisheries activities.	Computers, Software (AquaManager, eFishery and FiSAT), GPS.

COURSE ASSESSMENT

COURSE WORK (PRACTICAL BASED): 10%

TESTS (PRACTICAL BASED): 10%

PRACTICAL: 40%

EXAMINATION (THEORY AND PRACTICAL): 40%

TOTAL: 100%



ELEMENTS OF PHYSICS IN FISHERIES

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: ELEMENTS OF PHYSICS IN FISHERIES	COURSE CODE: FIT 127	CONTACT HOURS: 4HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1HOUR/WEEK
YEAR: I SEMESTER: II	PRE-REQUISITE:	PRACTICAL: 3HOURS/WEEK
GOAL: This course is designed to acquaint students with knowledge and skills in physics relevant for fisheries operations		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know the basic principles of physics; 2.0 Understand mechanics in fisheries operations; 3.0 Understand properties of fluids and pressure in aquaculture systems; 4.0 Understand heat transfer and temperature control in fisheries; 5.0 Know light and sound applications in fisheries; 6.0 Know electricity and energy concepts in fish farming systems.		

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY						
COURSE TITLE: ELEMENTS OF PHYSICS IN FISHERIES		COURSE CODE: FIT 127			CONTACT HOURS: 4HOURS/WEEK	
		CREDIT UNIT: 4			THEORETICAL: 1HOUR/WEEK	
YEAR: I SEMESTER: II		PRE-REQUISITE:			PRACTICAL: 3HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to acquaint students with knowledge and skills in physics relevant for fisheries operations						
GENERAL OBJECTIVE 1.0: Know the basic principles of physics						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher's Activities	Resources	Specific Learning Outcome	Teacher's Activities	Resources
1-2	1.1 Explain meaning and scope of physics in fisheries. 1.2 Explain branches of physics relevant to fisheries. 1.3 Explain measurement and units.	• Discuss concepts physics applications in fisheries • Discuss mechanics, heat, electricity, optics. • Discuss SI units and instruments.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Artificial Intelligence (AI), etc.	• Demonstrate proper handling of measuring instruments • Use basic measuring instruments	Guide student to • Demonstrate instrument handling • Use basic measuring instruments	Charts, Slides, Measuring tools, Vernier calipers.
General Objective 2.0: Understand mechanics in fisheries operations						

3-4	2.1.Explain motion, force and inertia. 2.2.Explain speed, velocity, acceleration. 2.3.Explain Friction 2.4.Explain work, energy, and power. 2.5.Explain boat movement and gear operation.	• Discuss motion and force • Discuss speed, velocity, acceleration. • Explain Friction • Explains work, energy and power. • Discuss boat movement and gear operations	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Artificial Intelligence (AI), etc.	• Determine velocity, acceleration and effect of frictional force on a model boat in a fishpond	• Guide students to determine velocity, acceleration and effect of frictional force on a model boat in a fishpond	PPE, Gear, Notepad, Model boat, Measuring tape, Stopwatch.
General Objective 3.0: Understand properties of fluids and pressure in aquaculture systems						
5-8	3.1 Explain fluid mechanics in fisheries. 3.2 Explain properties of fluids. 3.3 Explain water flow and hydraulics. 3.4 Explain pressure in fluids.	• Discuss fluid mechanics in fisheries. • Discuss properties of fluids (density, buoyancy, Viscosity and surface tension). • Discuss water flow and hydraulics.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Artificial Intelligence (AI), etc.	• Carry out practical to determine properties of fluid using a model boat in a pond • Demonstrate effect of height on water pressure • Construct a siphon using plastic hose	Guide students to: • Carry out practical to determine properties of fluid using a model boat in a pond • Demonstrate effect of height on water pressure • Construct a	Model boat, Water tanks, Pumps, Pressure Gauges, Hose, Measuring tape, Sawblade.

		Explain pressure in fluids			siphon using plastic hose	
General Objective 4.0: Understand heat transfer and temperature control in fisheries						
9-10	4.1 Explain heat. 4.2 Explain temperature. 4.3 Explain methods of measuring temperature. 4.4 Explain heat transfer methods. 4.5 Explain heat principles in fish processing. 4.6 Explain refrigeration principle. 4.7 Explain cold storage system.	- Discuss heat and temperature - Discuss methods of measuring temperature and instrument for measuring temperature - Discuss heat transfer methods - Discuss heat principles in fish processing - Discuss refrigeration principle - Discuss cold storage system	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Artificial Intelligence (AI), etc.	Measure temperature changes of tank and pond water using a thermometer	Guide students to measure temperature changes of tank and pond water using a thermometer	Thermometers, Notepad, Multiprobe meter.
General Objective 5.0: Know light and sound applications in fisheries						
11-12	5.1 Explain optics. 5.2 Explain sound. 5.3 Explain reflection and	- Discuss optics and sound - Discuss reflection and	Textbooks, Encyclopedia, E-books, Journals, Magazines,	Carry out light reflection, refraction and deflection experiments in the	Guide students to: Carry out light	Optical materials, Light source, Sound source.

	refraction. 5.4 Explain light applications in fisheries. 5.5 Explain sound applications in fisheries.	refraction - Explain light applications in fisheries - Explain sound applications in fisheries	Video clips, Charts, Marker, Multimedia Projector, Artificial Intelligence (AI), etc.	laboratory Demonstrate the applications of light and sound in fisheries	reflection, refraction and deflection experiments in the laboratory Demonstrate the applications of light and sound in fisheries	
General Objective 6.0: Know electricity and energy concepts in fish farming systems						
13-15	6.1 Explain the concept of energy. 6.2 Explain the concept of electricity. 6.3 Explain renewable energy. 6.4 Explain integration of renewable energy in fish farming. 6.5 Explain electrical safety in fishery operation. 6.6 Explain principles	- Discuss the concept of energy - Discuss the concept of electricity - Discuss renewable energy (Solar, Water and Wind) - Discuss integration of renewable	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Artificial Intelligence (AI), etc.	- Carry out maintenance of solar energy installation - Demonstrate electrical safety procedures in fisheries operations - Operate aeration equipment - Operate water pumping equipment	Guide students to: - Demonstrate maintenance of solar energy installation - Demonstrate electrical safety procedure in fisheries operations - Operate aeration	Pipes, Solar panel, Aerator, Water pump, Safety charts, PPE.

	of aeration in aquaculture. 6.7 Explain pumping systems used in fish farms. 6.8 Explain maintenance of electrical and pumping equipment.	energy in fish farming • Explain electrical safety in fishery operation • Discuss principles of aeration in aquaculture. • Explain pumping systems used in fish farms • Explain maintenance of electrical and pumping equipment			equipment • Operate water pumping equipment	
COURSE ASSESSMENT COURSE WORK (PRACTICAL BASED): 10% TESTS (PRACTICAL BASED): 10% PRACTICAL: 40% EXAMINATION (THEORY AND PRACTICAL): 40% TOTAL: 100%						



FISH FARM ENGINEERING

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: FISH FARM ENGINEERING	COURSE CODE: FIT 211	CONTACT HOURS: 4HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE: INTRODUCTION TO AQUACULTURE	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills in fish farm engineering		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the principles and importance of fish farm engineering; 2.0 Understand fish farm site assessment and selection; 3.0 Know how to design and construct simple fishponds and water systems; 4.0 Know how to operate and maintain fish farm equipment; 5.0 Know water management techniques in aquaculture systems; 6.0 Know fish farm mechanization techniques.		

PROGRAMME: NATIONAL DIPLOMA FISHERIES TECHNOLOGY						
COURSE TITLE: FISH FARM ENGINEERING		COURSE CODE: FIT 211		CONTACT HOURS: 4 HOURS/WEEK		
		CREDIT UNIT: 4		THEORETICAL: 1 HOUR/WEEK		
YEAR: II SEMESTER: I		PRE-REQUISITE: INTRODUCTION TO AQUACULTURE		PRACTICAL: 3 HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills in fish farm engineering						
GENERAL OBJECTIVE 1.0: Understand the principles and importance of fish farm engineering						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1-2	1.1 Explain the concept of fish farm engineering. 1.2 Explain the importance of fish farm engineering. 1.3 Explain the applications of fish farm engineering. 1.4 Describe engineering structures and facilities. 1.5 Explain hazards in fish farm and safety precautions practices in fish	• Explain the concept of fish farm engineering • Explain the importance of fish farm engineering • Explain the applications of fish farm engineering • Describe engineering structures and facilities. • Explain hazards in fish farm and safety precautions practices in fish farm	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Identify components from charts and video clips • Demonstrate safety precaution practices in fish farm	Guide student to: • Identify components from charts and video clips • Demonstrate safety precaution practices in fish farm	Farm layout Charts Video clips

	farm.					
General Objective 2.0: Understand fish farm site assessment and selection						
3-4	2.1 Explain criteria for fish farm site selection. 2.2 Explain site assessment procedures. 2.3 Explain topography, soil and water requirements. 2.4 Describe site survey techniques.	• Discuss criteria for fish farm site selection • Discuss site assessment procedures • Explain topography, soil and water requirements • Discuss site survey techniques.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Conduct site assessment • Carry out site survey techniques. • Evaluate sample sites. • Carry out soil test	Guide student to: • Conduct site assessment • Carry out site survey techniques. • Evaluate sample sites. • Carry out soil test	Soil and water samples, Survey tools.
General Objective 3.0: Know how to design and construct simple fishponds and water systems						
5-7	3.1 Explain fishpond types and designs. 3.2 Explain pond classifications and layouts. 3.3 Describe components of fishponds (Dikes, inlets and outlets etc.) 3.4 Explain pond construction procedures.	• Discuss fishpond types and designs. • Explain pond classifications and layouts • Describe components of fishponds (Dikes, inlets and outlets etc.) • Discuss pond construction	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Carry out layout of pond • Identify tools for excavation and construction of simple fish ponds. • Construct simple fishponds. • Construct aquarium tank	Guide student to: • Carry-out layout of pond • Demonstrate excavation and construction methods. • Construct simple fishponds. • Construct aquarium tank	Digger, GPS, Shovel, Wheelbarrow, Rope, Pegs, Machete, Glass, glass cutter, Silicon sealant.

	3.5 Explain the construction of aquarium tanks.	procedures Explain the construction of aquarium tanks.				
General Objective 4.0: Know how to operate and maintain fish farm equipment						
8-10	4.1 Explain fish farm equipment. 4.2 Explain the different categories of farm equipment and their uses. 4.3 Explain how to maintain fish farm equipment.	- Discuss fish farm equipment - Explain the different categories of farm equipment and their uses - Describe how to maintain fish farm equipment	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	- Identify the different categories of farm equipment and their uses - Operate some farm equipment - Carry-out maintenance of some fish farm equipment	Guide student to: - Identify the different categories of farm equipment and their uses - Operate some farm equipment - Carry-out maintenance of some fish farm equipment	Collapsible tank, earthen pond, Concrete pond, Pumps, PVC pipes, aerators, Automatic feeder, Sorting screen, grader, scoop-net, Dragnet, Water testing kits.
General Objective 5.0: Know water management techniques in aquaculture systems						
11-13	5.1 Explain water supply systems in fish farms. 5.2 Describe drainage systems. 5.3 Explain water control structures.	- Discuss water supply systems in fish farms. - Describe drainage systems. - Discuss water	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker,	- Identify different water supply installations. - Participate in practical demonstrations.	Guide students to: - Identify different water supply installations. - Participate in practical	Pipes and pumps Drainage models Construction materials Valves and

	5.4 Describe water management systems operation. 5.5 Explain gravity flow and pumping systems. 5.6 Describe water discharge structures.	control structures. • Explain water management systems operation • Discuss gravity flow and pumping systems. • Explain water discharge structures.	Multimedia Projector, etc.	• Construct simple water control structures. • Practice water regulation. • Demonstrate how to operate sluice gates and monk systems	demonstrations . • Construct simple water control structures. • Practice water regulation.	gates
General Objective 6.0: Know fish farm mechanization techniques						
14-15	6.1 Explain fish farm mechanization 6.2 Describe engineering tools and equipment. 6.3 Explain hatchery engineering systems. 6.4 Describe recirculating aquaculture systems (RAS) 6.5 Describe mechanized feeding and harvesting systems. 6.6 Explain how to	• Discuss fish farm mechanization • Discuss engineering tools and equipment. • Explain hatchery engineering systems. • Explain recirculating aquaculture systems (RAS) • Discuss mechanized feeding and harvesting systems. • Discuss how to use hand and power tools. • Discuss incubation and water circulation	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Demonstrate the use of hand and power tools • Practice handling of tools	Guide the student on: • Demonstrate the use of hand and power tools • Handling of tools	Drill, Grinder, Winches, Crane, Soil auger, Oxygen gas, Aerator.

	use hand and power tools 6.7 Explain incubation and water circulation systems.	systems				
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COURSE ASSESSMENT

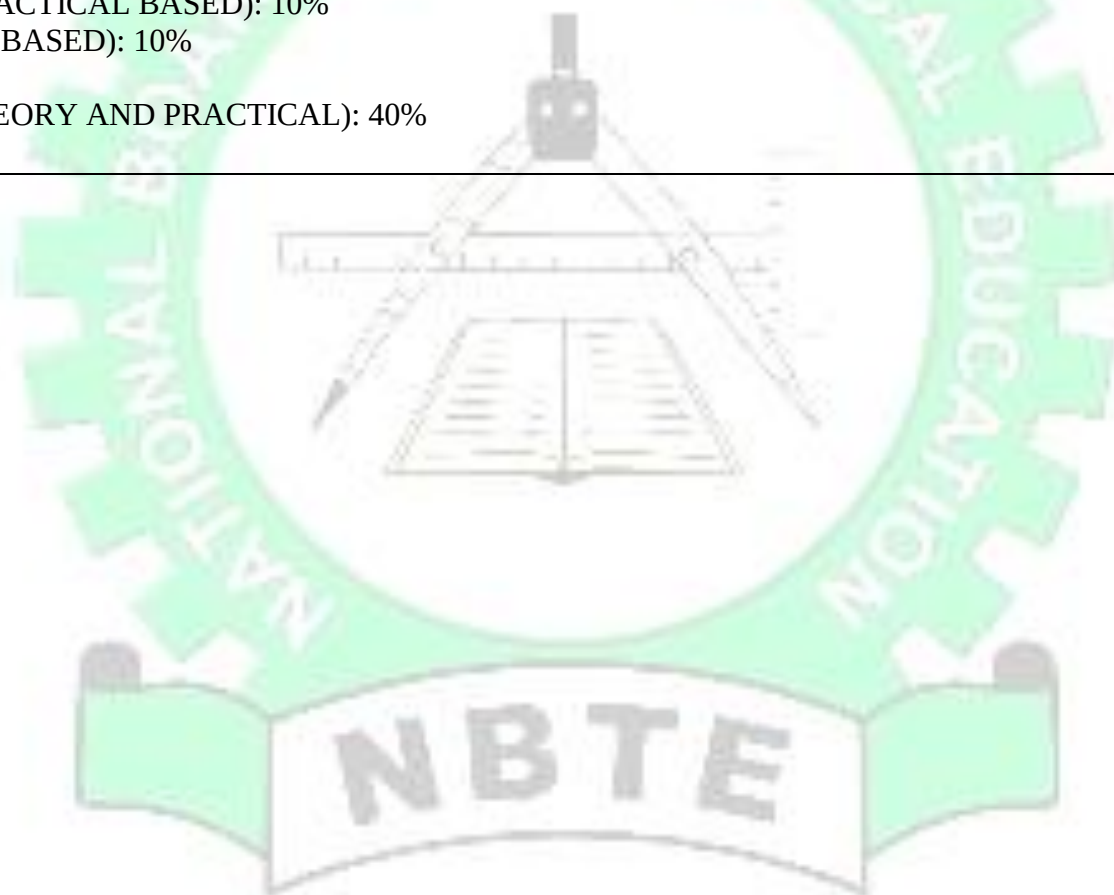
COURSE WORK (PRACTICAL BASED): 10%

TESTS (PRACTICAL BASED): 10%

PRACTICAL: 40%

EXAMINATION (THEORY AND PRACTICAL): 40%

TOTAL: 100%



FISH PROCESSING, STORAGE AND VALUE ADDITION

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: FISH PROCESSING, STORAGE AND VALUE ADDITION	COURSE CODE: FIT 212	CONTACT HOURS: 4HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE: INTRODUCTION TO FISHERIES TECHNOLOGY	PRACTICAL: 3HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills in fish processing, storage and value addition		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the principles, importance, and scope of fish processing, storage, and value addition in fisheries and aquaculture industries. 2.0 Know the causes of fish spoilage and how to apply appropriate preservation methods to maintain fish quality and safety. 3.0 Know practical skills in fish handling, processing, packaging, and storage using standard fisheries technologies and hygienic procedures. 4.0 Know how to apply various fish preservation techniques in fish processing operations. 5.0 Know how to utilize appropriate equipment, tools, and materials used in fish processing and storage activities. 6.0 Know how to apply quality control, food safety, sanitation, and biosecurity measures in fish processing and value addition operations. 7.0 Understand processing fish into value-added products for improved marketability, income generation, and reduced post-harvest losses.		

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY						
COURSE TITLE: FISH PROCESSING, STORAGE AND VALUE ADDITION		COURSE CODE: FIT 212			CONTACT HOURS: 4HOURS/WEEK	
		CREDIT UNIT: 4			THEORETICAL: 1HOUR/WEEK	
YEAR: II SEMESTER: I		PRE-REQUISITE: INTRODUCTION TO FISHERIES TECHNOLOGY			PRACTICAL: 3HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills in fish processing, storage and value addition						
GENERAL OBJECTIVE 1.0: Understand the principles, importance, and scope of fish processing, storage, and value addition in fisheries and aquaculture industries.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1-2	1.1 Explain the meaning of fish processing, storage, and value addition. 1.2 Explain the scope of fish processing, storage, and value addition. 1.3 Explain importance of fish processing, storage, and value addition. 1.4 Explain causes of fish spoilage and post-harvest losses. 1.5 Describe hygienic	- Discuss concepts of fish processing and discuss their economic and nutritional importance - Discuss microbial, enzymatic, and environmental causes of fish deterioration. - Discuss personal hygiene, sanitation, and food safety procedures.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	- Identify fish processing and storage facilities. - Identify signs of fresh and spoiled fish. - Apply hygienic handling procedures during fish processing. - Carry out simple fish smoking and drying	Guide students to: - Identify fish processing and storage facilities. - Identify signs of fresh and spoiled fish. - Apply hygienic handling procedures during fish processing. - Carry out simple fish smoking and	Processing tables, Fresh fish, spoiled fish samples, Protective clothing, Disinfectants, Handwashing facilities. Smoking kiln, drying racks, Salt, fish samples.

	handling practices in fish processing. 1.6 Explain traditional fish preservation methods.	Discuss smoking, drying, salting, and fermentation techniques.		activities.	drying activities.	
General Objective 2.0: Know how to identify causes of fish spoilage and apply appropriate preservation methods to maintain fish quality and safety						
3-4	2.1 Explain the meaning of fish preservation and quality control. 2.2 Explain the importance of fish preservation and quality control. 2.3 Explain the causes of fish spoilage. 2.4 Explain factors affecting fish quality during handling and storage. 2.5 Describe principles of fish preservation methods. 2.6 Explain	- Discuss concepts of fish spoilage, preservation, and food safety through lecture and discussion. - Explain microbial, enzymatic, chemical, and physical causes of spoilage. - Discuss temperature, moisture, contamination, and handling methods affecting fish quality. - Explain preservation principles such as drying, smoking, salting, chilling, and freezing.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	- Identify signs of spoilage in fish samples - Demonstrate proper fish handling procedures. - Identify preservation equipment and materials. - Preserve fish using chilling and freezing methods.	Guide students to: - Identify signs of spoilage in fish samples - Demonstrate proper fish handling procedures. - Identify preservation equipment and materials. - Preserve fish using chilling and freezing methods.	Spoiled fish samples, Freezer, thermometer, PPE.

	chilling and freezing methods of fish preservation.	Discuss storage temperature requirements and cold chain management.				
General Objective 3.0: Know how to demonstrate practical skills in fish handling, processing, packaging, and storage using standard fisheries technologies and hygienic procedures.						
5-6	3.1 Explain the importance of proper fish handling, processing, packaging, and storage in fisheries operations. 3.2 Describe fish quality indicators and handling requirements. 3.3 Explain hygienic procedures in fish processing operations. 3.4 Describe fish dressing and preparation techniques. 3.5 Explain fish smoking technologies and	- Discuss concepts of post-harvest handling, processing, and hygiene practices through lecture and discussion. - Explain freshness indicators, contamination risks, and handling procedures. - Discuss sanitation, personal hygiene, and workplace cleanliness procedures. - Explain fish scaling, gutting, filleting, and dressing methods. - Discuss types of smoking kilns and methods of	Whiteboard, charts, projector, Charts, videos, textbooks Hygiene manuals, charts, projector Diagrams, videos, textbooks Smoking kiln, charts, videos	- Identify fish handling and processing equipment used in fisheries operations. - Demonstrate proper handling of fresh fish to prevent spoilage and damage. - Apply hygienic practices during fish processing activities. - Dress and prepare fish using standard	Guide students to: - Identify fish handling and processing equipment used in fisheries operations. - Demonstrate proper handling of fresh fish to prevent spoilage and damage. - Apply hygienic practices during fish processing activities. - Dress and prepare fish	Fish processing tools, PPE, fish samples Fresh fish, clean water, gloves, trays Detergents, disinfectants, PPE, cutting boards, fish samples Smoking kiln, charcoal, fish trays

	procedures.	smoking.		processing methods. • Smoke fish using standard smoking techniques.	using standard processing methods. • Smoke fish using standard smoking techniques.	
General Objective 4.0: Know how to apply various fish preservation techniques in fish processing operations						
7-8	4.1 Explain the importance and principles of fish preservation in fisheries operations. 4.2 Explain the principles of fish preservation in fisheries operations. 4.3 Explain causes of fish spoilage and methods of prevention. 4.4 Explain fish smoking techniques and procedures. 4.5 Explain drying methods used in	• Discuss concepts, objectives, and benefits of fish preservation methods through lecture and discussion. • Discuss microbial, chemical, enzymatic, and physical causes of spoilage. • Teach hot smoking and cold smoking methods and safety precautions. • Discuss sun drying, solar drying, and mechanical drying techniques. • Discuss dry salting and brining methods and preservation principles.	Whiteboard, charts, projector, Charts, videos clip, textbooks Smoking charts, videos, textbooks Drying charts, Salt samples,	• Identify preservation equipment and materials used in fish processing. • Identify signs of spoilage in fresh fish samples. • Smoke fish using standard smoking techniques. • Dry fish using appropriate drying methods. • Preserve fish using salting and brining techniques.	Guide students to: • Identify preservation equipment and materials used in fish processing. • Identify signs of spoilage in fresh fish samples. • Smoke fish using standard smoking techniques. • Dry fish using appropriate drying methods. • Preserve fish using salting and brining techniques.	Smoking kiln, freezer, drying racks, fish samples Fresh fish, spoiled fish samples, gloves Smoking kiln, charcoal, trays, fish samples Drying racks, solar dryer, fish samples Salt, basins, fish samples

	fish preservation. 4.6 Explain salting and brining techniques in fish processing.					
General Objective 5.0: Know how to utilize appropriate equipment, tools, and materials used in fish processing and storage activities						
9-10	5.1 Explain the importance of equipment, tools, and materials in fish processing and storage operations. 5.2 Describe classification of fish processing equipment and tools. 5.3 Explain hygienic handling and maintenance of fish processing tools. 5.4 Describe cutting, dressing, and filleting tools used in fish processing. 5.5 Explain smoking equipment and materials used in	• Discuss types and functions of fish processing and storage equipment through lecture and discussion. • Explain manual and mechanical equipment used in fish processing. • Discuss sanitation, cleaning, and maintenance procedures for equipment and tools. • Explain functions and safety precautions for cutting and dressing tools. • Discuss types of smoking kilns and fuel materials used in fish smoking.	Whiteboard, charts, projector textbooks, Diagrams, Hygiene manuals, Processing charts, videos clips Smoking kiln,	• Identify fish processing and storage equipment used in fisheries operations. • Classify equipment and tools according to their uses. • Maintain fish processing equipment properly. • Use fish cutting and dressing tools safely and effectively. • Operate fish smoking equipment correctly.	Guide student to; • Identify and handle equipment and tools. • Sorting and categorizing processing tools. • Demonstrate washing, sanitizing, and maintenance procedures. • Identify fish scaling, gutting, and filleting techniques. • Demonstrate arrangement and operation of smoking kiln.	Fish processing equipment, PPE, fish samples Knives, drying racks Detergents, Disinfectants, brushes, cutting boards, fish samples Smoking kiln, charcoal, fish trays

	fish preservation.					
General Objective 6.0: Know how to apply quality control, food safety, sanitation, and biosecurity measures in fish processing and value addition operations.						
11-12	6.1 Explain the concepts of quality control, food safety, sanitation, and biosecurity in fish processing operations. 6.2 Explain sources of contamination in fish processing and storage 6.3 Explain the causes of contamination in fish processing and storage 6.4 Explain food safety standards and regulations in fisheries operations. 6.5 Describe sanitation procedures and workplace hygiene practices 6.6 Explain	• Discuss principles and importance of quality assurance and safety practices through lecture and discussion. • Discuss biological, chemical, and physical contaminants affecting fish products. • Discuss national and international food safety standards and guidelines. • Discuss cleaning schedules, sanitation methods, and personal hygiene requirements. • Discuss biosecurity protocols, access control, and disease prevention measures.	Textbooks, Encyclopedias, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Identify sanitation and biosecurity facilities used in fish processing operations. • Identify contamination risks in fish processing environments. • Apply food safety procedures during fish handling and processing. • Perform sanitation and cleaning procedures in fish processing areas • Apply biosecurity measures in	Guide students to: • Identify sanitation and biosecurity facilities used in fish processing operations. • Identify contamination risks in fish processing environments. • Apply food safety procedures during fish handling and processing. • Perform sanitation and cleaning procedures in fish processing areas • Apply biosecurity measures in fish processing	PPE, disinfectants, fish processing facility, Fish samples, Observation checklist, Fish trays, Detergents, Brushes, Footbath.

	biosecurity principles and measures in fish processing facilities.			fish processing operations.	operations.	
General Objective 7.0: Understand processing fish into value-added products for improved marketability, income generation, and reduced post-harvest losses.						
13-15	7.1 Explain the concept and importance of value addition in fish processing. 7.2 Explain causes of post-harvest fish losses and methods of reduction. 7.3 Describe fish processing methods used in value addition. 7.4 Explain fish filleting and fish cutting techniques for product development. 7.5 Explain preparation of fish snacks and ready-to-eat products.	• Discuss concepts, benefits, and economic importance of value-added fish products through lecture and discussion. • Discuss spoilage factors, handling practices, and loss prevention strategies. • Describe smoking, drying, salting, frying, and packaging techniques. • Discuss fish dressing, deboning, and filleting procedures. • Discuss ingredients, preparation methods, and quality standards for fish snacks.	Whiteboard, charts, projector, Charts, textbooks, charts, video clips Diagrams, Textbooks Recipe charts	• Identify common value-added fish products and processing materials. • Apply proper handling methods to reduce post-harvest losses. • Process fish using basic value addition techniques. • Prepare fish fillets and cuts for value-added processing. • Produce fish snacks and ready-to-eat fish products.	Guide students to: • Identify processed fish products and ingredients. • Demonstrate hygienic fish handling and preservation practices. • Demonstrate fish preparation and processing procedures. • Demonstrate fish filleting and trimming techniques. • Prepare fish rolls, fish pie, and fish balls.	Fish samples, Processed fish products, PPE, Fresh fish, Trays, Clean water, Smoking kiln, Drying racks, Knives, Cutting boards, Fish mince, Flour, Spices, Fryer, Vegetable oil.

COURSE ASSESSMENT

COURSE WORK (PRACTICAL BASED): 10%

TESTS (PRACTICAL BASED): 10%

PRACTICAL: 40%

EXAMINATION (THEORY AND PRACTICAL): 40%

TOTAL: 100%



BASIC FISH FEED PRODUCTION

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: BASIC FISH FEED PRODUCTION	COURSE CODE: FIT 213	CONTACT HOURS: 4HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE: INTRODUCTION TO AQUACULTURE	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to acquaint students with the knowledge and skills required for basic fish feed production		
GENERAL OBJECTIVES: At the end of the course, the student should be able to: 1.0 Understand the importance of fish feed in aquaculture; 2.0 Know how to operate basic feed production equipment; 3.0 Know feed ingredients used in fish feed formulation and production; 4.0 Know how to conduct simple fish feed processing, quality control and storage.		

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY						
COURSE TITLE: BASIC FISH FEED PRODUCTION		COURSE CODE: FIT 213			CONTACT HOURS: 4HOURS/WEEK	
		CREDIT UNIT: 4			THEORETICAL: 1HOUR/WEEK	
YEAR: II SEMESTER: I		PRE-REQUISITE: INTRODUCTION TO AQUACULTURE			PRACTICAL: 3HOURS/WEEK	
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to acquaint students with the knowledge and skills required for basic fish feed production						
GENERAL OBJECTIVE 1.0: Understand the importance of fish feed in aquaculture						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1-2	1.1 Explain the concept of fish feed production. 1.2 Explain types of fish feeds. 1.3 Explain importance of fish feed production.	- Explain the concept of fish feed production. - Discuss floating, sinking, starter - Explain importance of fish feed production.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	Identify fish feed types	Guide students to identify feed types	Charts, Multimedia projector Fish feed samples,
General Objective 2.0: Know how to operate basic feed production equipment						
3-7	2.1 Describe feed production equipment. 2.2 Explain feed ingredient grinding and mixing. 2.3 Explain feed	- Discuss grinding, mixing, pelleting, drying and packaging machines - Explain	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker,	- Demonstrate feed processing sequence - Identify and	Guide students to: - Identify and operate simple machines. - Participate in	Feed mill equipment, Hammer mill, Mixer, Pelletizer, Pelletize tray, Extruder,

	processing operations. 2.4 Explain drying and cooling methods. 2.5 Explain extrusion principles and floating feed production.	operation of feed equipment • Discuss drying and cooling methods • Explain extrusion principles and floating feed production	Multimedia Projector, etc	operate simple fish feed production machines • Carry out floating feed production • Produce sinking pellets • Dry and package feeds	floating feed production Dry and package feeds	Dryer. Drying racks, Packaging bags.
General Objective 3.0: Know feed ingredients used in fish feed formulation and production						
8-11	3.1 List common feed ingredients. 3.2 Explain feed ingredients according to nutrient composition 3.3 Explain nutrient requirements of fish. 3.4 Explain feed formulation principles.	• Explain common feed ingredients • Explain plant and animal protein sources. • Discuss protein, carbohydrate, fat, vitamin and mineral sources. • Discuss nutrient requirements at different growth stages.	Textbooks, Encycloped ia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Identify feed ingredients physically.	Guide the students to: • Identify feed ingredients physically. • Sort ingredients based on nutrients composition • Formulate fish feeds	Soya bean meal, Fish meal, Maize, wheat bran, Feed ingredient samples, Charts, manuals. Feed formulation sheets, Ingredient price lists, Pelleting

	3.5 Explain least-cost feed formulation. 3.6 Explain the Production of floating fish feed.	• Discuss Pearson Square method, linear programming for least cost and trial and error methods of fish feed formulation. • Introduce cost analysis methods.		• Sort ingredients based on nutrients composition • Formulate fish feeds using Pearson Square method, linear programming for least cost and trial and error • Produce pelleted fish feed • Compute feed formulation costs	using Pearson Square method, linear programming for least cost and trial and error • Produce pelleted fish feed • Compute feed formulation costs	machine, Hammer mill, Dryer.
General Objective 4.0: Know how to conduct simple fish feed processing, quality control and storage						
12-15	4.1 Explain feed preservation and storage conditions. 4.2 List factors	• Discuss feed preservation and storage conditions	Textbooks, Encycloped ia, E-books, Journals,	• Examine spoiled feed samples.	Guide students to: • Examine spoiled feed	Storage facility, Pallets, Sample fish

	affecting feed quality. 4.3 Explain feed storage techniques. 4.4 Explain proximate analysis principles.	• Discuss moisture, contamination and spoilage • Discuss feed storage techniques • Discuss proximate analysis principles	Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Demonstrate physical quality assessment • Test pellet durability and floatability • Conduct simple feed quality control tests • Carryout proximate analysis of fish feed • Store feed samples correctly	samples. • Demonstrate physical quality assessment • Test pellet durability and floatability • Conduct simple feed quality control tests • Carryout proximate analysis of fish feed • Store feed samples correctly	feeds, Moisture meter. Water containers, Sieves.
COURSE ASSESSMENT COURSE WORK (PRACTICAL BASED): 10% TESTS (PRACTICAL BASED): 10% PRACTICAL: 40% EXAMINATION (THEORY AND PRACTICAL): 40% TOTAL: 100%						

FISHING GEAR AND CRAFT TECHNOLOGY II

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: FISHING GEAR AND CRAFT TECHNOLOGY II	COURSE CODE: FIT 214	CONTACT HOURS: 4 HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE: FISHING GEAR AND CRAFT TECHNOLOGY I	PRACTICAL: 3 HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills of designing, constructing and use of common fishing gears		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the use of twines and ropes in gear construction 2.0 Know the various types of knots and splices in net mending 3.0 Understand net braiding and mending 4.0 Know the nomenclature of fishing twines and ropes 5.0 Understand the design and construction methods of various fishing gear 6.0 Understand the functions of fishing gear accessories 7.0 Understand the system of ordering netting materials		

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY						
COURSE TITLE: FISHING GEAR AND CRAFT TECHNOLOGY II		COURSE CODE: FIT 214		CONTACT HOURS: 4 HOURS/WEEK		
		CREDIT UNIT: 4		THEORETICAL: 1HOUR/WEEK		
YEAR: II SEMESTER: I		PRE-REQUISITE: FISHING GEAR AND CRAFT TECHNOLOGY I		PRACTICAL: 3 HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills of designing, constructing and use of common fishing gears						
GENERAL OBJECTIVE 1.0: Understand the use of twines and ropes in gear construction						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1-2	1.1 Explain the types of twine and rope used net construction. 1.2 Explain various tools used for gear construction. 1.3 Explain simple safety rules while working with twine.	- Describe the types of twine and rope used net construction - Describe various tools used for gear construction - Explain simple safety rules while working with twine	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	- Identify twines and ropes - Demonstrate the use of various tools for gear construction	Guide students to: - Identify twines and ropes - Demonstrate the use of various tools for gear construction	Nettings, Ropes, Twines, Knives, Mesh gauge, Fisherman needle.
General Objective 2.0: Know the various types of knots and splices in net mending						
3-5	2.1 Explain basic knot types. 2.2 Describe the uses of various	- Describe basic knot types - Describe the uses of various knots in	Textbooks, Encyclopedia, E-books, Journals,	- Construct different types of knots - Construct different splices	Guide students to: Identify various knots used for construction	Ropes. Twines, Knives Nails/knitting

	knots in construction and mending of net. 2.3 Explain methods of tying knots. 2.4 Explain types of splices.	construction and mending of net • Explain methods of tying knots • Describe types of splices	Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.		and mending net • Construct splices	needle, Spike.
General Objective 3.0: Understand net braiding and mending						
6-7	3.1 Explain the two types of braiding. 3.2 Explain various types of tears of net for mending. 3.3 Explain the term “the run of the knot” in netting.	• Describe the two types of braiding • Describe various types of tears of net for mending • Discuss the term “the run of the knot” in netting	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Carry out braiding of netting • Mend a torn net • Examine the “run of the knot” on the braided netting	Guide students to: • Carry out netting braiding to the student • Mend a torn net • Examine the “run of the knot” on the braided netting	Twine, Fisherman needle, Mesh gauge, Knives.
General Objective 4.0: Know the nomenclature of fishing twines and ropes						
8	4.1 Explain the components of netting yarn. 4.2 Explain the system of yarn count. 4.3 Explain the differences between the system of yarn	• Describe the components of netting yarn • Describe the system of yarn count • Discuss the differences between the system of yarn count • Explain how to	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector,	• Identify fiber, yarn and types of strands • Identify types of twists	Guide students to • Identify fiber, yarn, strands and twists	Ropes, Twines, Knife.

	count. 4.4 Explain how to calculate and convert each system to another.	calculate and convert each system to another	etc.			
General Objective 5.0: Understand the design and construction methods of various fishing gear						
9-12	5.1 Explain various types of trawl net. 5.2 Explain the design processes of a trawl. 5.3 Explain how to fix other accessories on trawl net. 5.4 Describe various types of gill net. 5.5 Explain the construction of gill net. 5.6 Describe trammel net. 5.7 Explain the construction of trammel net. 5.8 Explain gill net and Trammel net. 5.9 Describe the construction of some other	- Describe various types of trawl net - Describe the design processes of a trawl - Discuss how to fix other accessories on trawl net - Describe various types of gill net - Explain the construction of gill net - Describe trammel net - Explain the construction of trammel net - Discuss gill net and Trammel net - Describe the construction of some other fishing gears such as Cast	Textbooks, Encyclopedi a, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	- Carry out tapering into required shape of a small trawl part - Assemble trawl net accessories to be attached - Construct a small gill net - Construct a small trammel net - Construct a hook and line - Construct a fish trap	Guide the students to: - Carry out tapering into required shape of a small trawl part - Assemble trawl net accessories to be attached - Construct a small gill net - Construct a small trammel net - Construct a hook and line - Construct a fish trap	Nettings. Fisherman needle, Twine, Knife, Hooks, Cane, Bamboo, Rubber netting.

	fishing gears such as Cast net, Hook and line, fish traps, hand clap.	net, Hook and line, fish traps, hand clap				
General Objective 6.0: Understand the functions of fishing gear accessories						
13-14	6.1 List the accessories required on fishing gears. 6.2 Explain the functions of the accessories on fishing gears. 6.3 Describe local materials suitable for fishing gear accessories. 6.4 Describe otter board as accessory of trawl net. 6.5 Explain the functions of otter board in trawling. 6.6 Explain the relationship between otter board and size of trawl.	- Describe the accessories required on fishing gears - Discuss the functions of the accessories on fishing gears - Explain local materials suitable for fishing gear accessories - Describe otter board as accessory of trawl net - Explain the functions of otter board in trawling - Explain the relationship between otter board and size of trawl	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	- Assemble fishing gear accessories - Identify local material that can be suitable for fishing gear accessories	Guide students to: - Assemble fishing accessories - Identify local material that can be suitable for fishing gear accessories	Buoy, Floaters, Bobbins Tickler chain, Lead sinker Otter board guard Bamboo Styrofoam, Lead sheet.

General Objective 7.0: Understand the system of ordering netting materials						
15	7.1 Explain the factors that influence choice of netting for fishing gear. 7.2 Explain the method of specifying netting while ordering. 7.3 Describe which netting may be good for specific fishing gear.	• Discuss the factors that influence choice of netting for fishing gear • Discuss the method of specifying netting while ordering • Explain which netting may be good for specific fishing gear	Textbooks, Encyclopedias, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Identify types of nettings and twine	• Guide students to identify types of nettings and twine	Nettings, Twines, Fisherman needle.
COURSE ASSESSMENT COURSE WORK (PRACTICAL BASED): 10% TESTS (PRACTICAL BASED): 10% PRACTICAL: 40% EXAMINATION (THEORY AND PRACTICAL): 40% TOTAL: 100%						

AQUACULTURE WATER QUALITY MANAGEMENT

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: AQUACULTURE WATER QUALITY MANAGEMENT	COURSE CODE: FIT 215	CONTACT HOURS: 4HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE: INTRODUCTION TO AQUACULTURE	PRACTICAL: 3HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills in aquaculture water quality management for sustainable fish production and environmental protection		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the importance of water quality in aquaculture; 2.0 Know how to conduct physical, chemical and biological water quality analysis; 3.0 Know how to monitor and manage water quality in aquaculture systems; 4.0 Understand water pollution and their sources; 5.0 Know how to apply aeration and waste management practices; 6.0 Understand pond fertilization and productivity management; 7.0 Know how to apply water treatment and purification techniques.		

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY						
COURSE TITLE: AQUACULTURE WATER QUALITY MANAGEMENT		COURSE CODE: FIT 215		CONTACT HOURS: 4HOURS/WEEK		
		CREDIT UNIT: 4		THEORETICAL: 1 HOURS/WEEK		
YEAR: II SEMESTER: I		PRE-REQUISITE: INTRODUCTION TO AQUACULTURE		PRACTICAL: 3HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills in aquaculture water quality management for sustainable fish production and environmental protection						
GENERAL OBJECTIVE 1.0: Understand the importance of water quality in aquaculture						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1-2	1.1 Explain the meaning of water quality management. 1.2 Explain the importance of water quality management. 1.3 Explain concepts of water quality in aquaculture. 1.4 Explain physical, chemical and biological parameters of water.	• Discuss the meaning of water quality management • Discuss the importance of water quality management • Explain concepts of water quality in aquaculture • Discuss physical, chemical and biological	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Identify major water quality parameters • Identify water quality parameters from charts and samples	Guide students to: • Identify major water quality parameters • Identify water quality parameters from charts and samples	Water samples, Charts.

		parameters of water				
General Objective 2.0: Know how to conduct physical, chemical and biological water quality analysis						
3-4	2.1 Explain the physical properties of water. 2.2 Explain chemical properties of water. 2.3 Explain biological properties of water. 2.4 Explain roles of aquatic organisms in water quality parameters.	• Discuss temperature, turbidity, transparency and colour of water • Discuss pH, dissolved oxygen, alkalinity and hardness • Discuss plankton, microorganisms and aquatic plants. • Discuss roles of aquatic organisms in water quality parameters	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Measure physical water quality parameters • Measure chemical water quality parameters • Identify biological parameters in water samples. • Identify beneficial and harmful organisms	Guide students to: • Measure physical water quality parameters • Measure chemical water quality parameters • Collect and identify biological samples in water • Identify beneficial and harmful organisms	Water testing kits, Water testing kits, Microscopes, Slides, Biological samples.
General Objective 3.0: Know how to monitor and manage water quality in aquaculture systems						
5-6	3.1 Explain water sampling techniques.	• Explain water sampling techniques	Textbooks, Encyclopedia, E-books,	• Transport preserved water samples properly	Guide students to: • Preserve and transport water	Sampling bottles, Fish pond,

	3.2 Describe proper method of preserving water samples. 3.3 Describe proper ways of transporting water samples.	• Explain proper method of preserving water samples • Explain proper ways of transporting water samples	Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Sample physical, chemical and biological parameters of ponds • Record the sampled parameters above • Carry out analysis and interpretation of water sample recorded above for temperature, turbidity, transparency, pH, dissolved oxygen, alkalinity and hardness. • Write a report that technically shows the results above.	samples properly • Sample physical, chemical and biological parameters of ponds • Record the sampled parameters above • Analyze and interpret water sample recorded above for temperature, turbidity, transparency, pH, dissolved oxygen, alkalinity and hardness. • Write a report that technically shows the results above.	Testing kits, pH meter, DO meter, Conductivity meter, Multiprobe meter.
General Objective 4.0: Understand water pollution and their sources						
7-8	4.1 Define pollution. 4.2 Describe various sources of pollution. 4.3 Explain sources of water	• Discuss pollution • Discuss various sources of pollution • Explain	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips,	• Identify polluted water • Identify effects of pollution on fish • Identify effects of pollution on other	Guide students to: • Identify polluted water • Identify effects of pollution on fish	Water testing kit Fish samples, Sample of any other aquatic organism.

	pollution in aquaculture. 4.4 Discuss organic and inorganic pollutants. 4.5 Explain the effects of pollution on fishes.	sources of water pollution in aquaculture. • Discuss organic and inorganic pollutants. • Explain the effects of pollution on fishes	Charts, Marker, Multimedia Projector, etc.	aquatic organisms	• Identify effects of pollution on other aquatic organisms	
General Objective 5.0: Know how to apply aeration and waste management practices						
9-10	5.1 Explain dissolved oxygen management. 5.2 Explain aeration methods in aquaculture. 5.3 Explain aeration systems in aquaculture. 5.4 Explain proper waste management practices.	• Discuss dissolved oxygen management • Describe aeration methods in aquaculture • Discuss aeration systems in aquaculture • Discuss proper waste management practices	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Operate aeration equipment. • Carry out routine maintenance on aerating equipment • Carry out other methods of aeration e.g. Flow-through, paddlewheel etc.	Guide students to: • Operate aeration equipment. • Carry out routine maintenance on aerating equipment • Carry out other methods of aeration e.g. Flow-through, paddlewheel etc.	Aerators and blowers, Paddlewheel, Sprinkler.
General Objective 6.0: Understand pond fertilization and productivity management						

11-12	6.1 Explain pond fertilization and productivity management. 6.2 Explain the importance of fertilization. 6.3 Explain organic and inorganic fertilizers. 6.4 Explain fertilization rate per volume of water.	• Explain pond fertilization and productivity management. • Discuss importance of fertilization • Discuss organic and inorganic fertilizers. • Explain fertilization rate per volume of water	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Identify organic and inorganic fertilizers • Conduct fertilizer application using different methods • Monitor pond productivity • Demonstrate plankton assessment techniques • Determine the rate of fertilization for a given of pond	Guide students to: • Identify organic and inorganic fertilizers • Conduct fertilizer application using different methods • Monitor pond productivity • Demonstrate plankton assessment techniques • Determine the rate of fertilization for a given of pond	Fertilizer samples, Microscopes, Fish pond, Plankton net, Secchi disc.
General Objective 7.0: Know how to apply water treatment and purification techniques						
13-15	7.1 Explain water treatment and purification methods. 7.2 Explain liming in pond preparation. 7.3 Explain Recirculating Aquaculture Systems (RAS). 7.4 Explain	• Discuss water treatment and purification methods. • Discuss liming in pond preparation • Explain Recirculating Aquaculture Systems	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Demonstrate pond treatment procedures • Demonstrate liming procedure • Apply environmental protection measures by proper waste management • Demonstrate biofilter operation	Guide students to: • Demonstrate pond treatment procedures • Demonstrate liming procedure • Apply environmental protection measures by proper waste management	RAS facility, Lime.

	filtration, sedimentation and disinfection. 7.5 Explain sludge management and effluent treatment. 7.6 Explain water reuse and biofiltration systems. 7.7 Explain environmental sustainability in aquaculture. 7.8 Explain climate-smart aquaculture and water conservation.	(RAS). • Discuss filtration, sedimentation and disinfection. • Discuss sludge management and effluent treatment • Discuss water reuse and biofiltration systems • Explain environmental sustainability in aquaculture • Discuss climate-smart aquaculture and water conservation		procedures • Operate a Recirculating Aquaculture Systems (RAS).	• Demonstrate biofilter operation procedures • Operate a Recirculating Aquaculture Systems (RAS).	
COURSE ASSESSMENT COURSE WORK (PRACTICAL BASED): 10% TESTS (PRACTICAL BASED): 10% PRACTICAL: 40% EXAMINATION (THEORY AND PRACTICAL): 40% TOTAL: 100%						

PRACTICAL FISHING

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: PRACTICAL FISHING	COURSE CODE: FIT 216	CONTACT HOURS: 4HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1HOUR/WEEK
YEAR: II SEMESTER: I	PRE-REQUISITE:	PRACTICAL: 3HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills required for safe, efficient and sustainable fishing operations in inland and marine fisheries		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know suitable habitat for fish and types of gear suitable for each fishing location; 2.0 Understand the essential preparation necessary for a fishing trip; 3.0 Know fishing techniques in inland and marine waters; 4.0 Know how to apply safety measures during fishing operations; 5.0 Understand different methods of locating school/shoal of fish; 6.0 Know how best to handle gears onboard and at shore.		

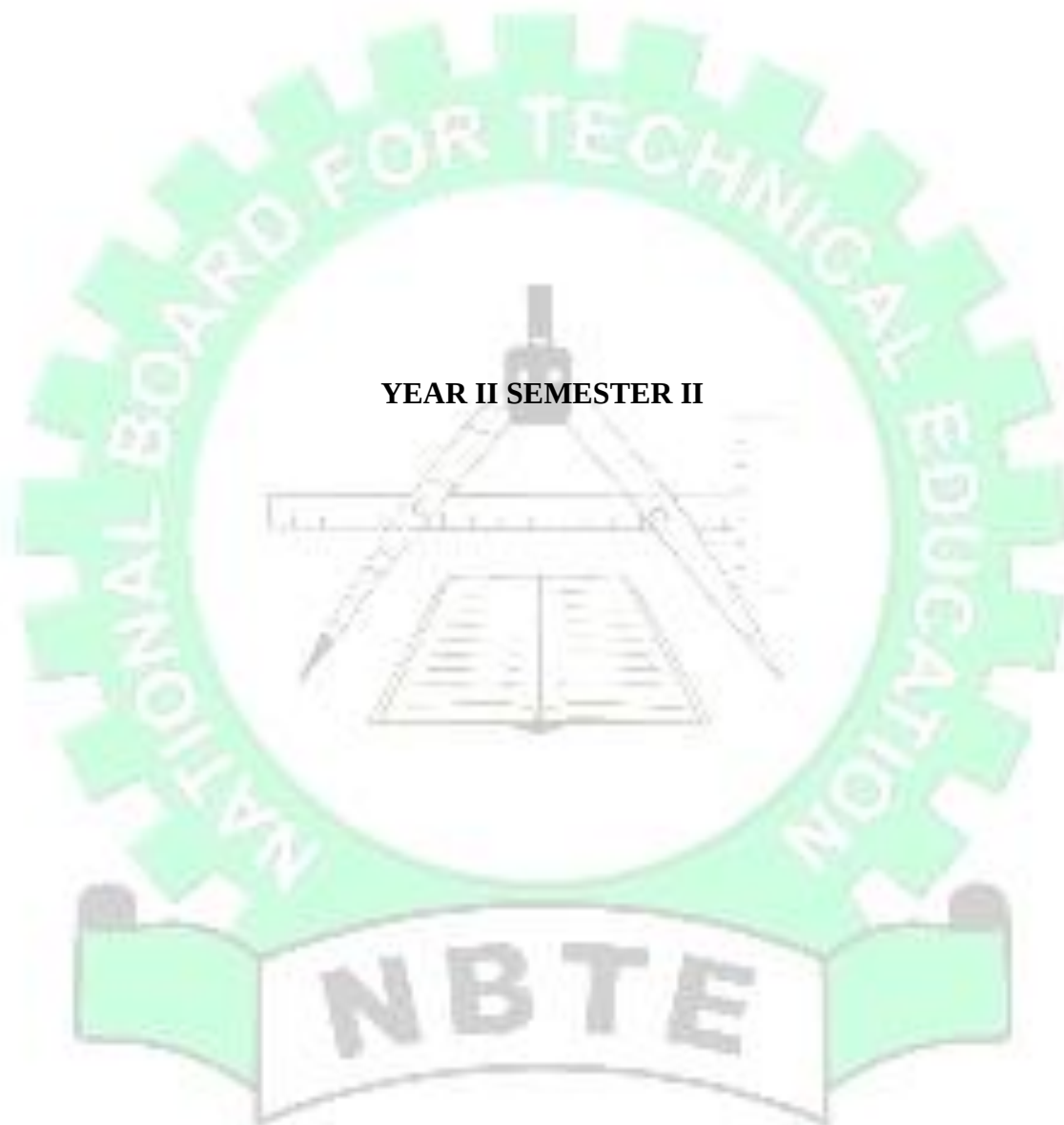
PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY						
COURSE TITLE: PRACTICAL FISHING		COURSE CODE: FIT 216		CONTACT HOURS: 4HOURS/WEEK		
		CREDIT UNIT: 4		THEORETICAL: 1HOUR/WEEK		
YEAR: II SEMESTER: I		PRE-REQUISITE:		PRACTICAL: 3HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills required for safe, efficient and sustainable fishing operations in inland and marine fisheries						
GENERAL OBJECTIVE 1.0: Know suitable habitat for fish and types of gear suitable for each fishing location						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1	1.1 Explain the suitable habitat for fish. 1.2 Describe the relationship between habitat and fishing. 1.3 Explain species of fish found in different water bodies. 1.4 Explain different water bodies -ocean, sea, rivers, lakes, streams.	• Explain what constitutes a fish habitat • Explain the correlation between fish habitat and fishing • Explain why some fish can only be found in certain water bodies	Whiteboard, lecture notes, Projector, Fisheries textbooks, Charts, Marker board, Journals, Instructional materials, etc.	• Identify a fish habitat • Identify different water bodies - ocean, sea, rivers, lakes, streams using video clips • Identify species of fishes found in different habitats	Guide the students to: • Identify a fish habitat • Identify different water bodies -ocean, sea, rivers, lakes, streams using video clips • Identify species of fishes found in different habitats	Video clips, Multimedia projector, Charts.

General Objective 2.0: Understand the essential preparation necessary for a fishing trip						
2-3	2.1 Explain the need for proper preparation for fishing trip. 2.2 List materials needed for fishing trip. 2.3 Describe preparation for a day fishing trip and a long duration trip. 2.4 Explain the importance of each itemized material needed for fishing.	• Discuss the need for proper preparation for fishing trip • Discuss the importance of each itemized material needed for fishing • Explain the difference between preparation for a day fishing trip and a long duration trip • Discuss the importance of each itemized material needed for fishing	Whiteboard, lecture notes, Projector, Fisheries textbooks, Charts, Marker board, Journals, Instructional materials, etc.	• Identify materials for fishing trip	• Guide students to identify materials for fishing trip	Boat in good shape, Net, Fisherman needle, Twine None netting gear, Cold Fish boxes, Knives, Lighting system, Food, Water.
General Objective 3.0: Know fishing techniques in inland and marine waters.						
4-7	3.1 List different fishing gears. 3.2 Explain the operational mode of each fishing gear. 3.3 Explain how to mend a torn net. 3.4 Explain other unconventional fishing methods.	• Explain the classification of fishing gears into two broad categories -passive and active • Discuss the operational mode of each fishing gear • Explain the	Whiteboard, lecture notes, Projector, Fisheries textbooks, Charts, Marker board, Journals, Instructional	• Handle different netting and none netting gears in the Net loft workshop • Demonstrate the use of each gear in a small water body • Mend a torn net	Guide students to: • Handle different netting and none netting gears in the Net loft workshop • Demonstrate the use of each gear in a small	Boat, Netting gears, Non netting gear, Twine, Gammalin 20, Rotenone, Grenade, Flash light, Fisherman needle.

	3.5 Describe the gears for sport fishing.	functionalities of these fishing methods • Explain sport fishing	materials, etc.	• Demonstrate the use of light in fishing in a small water body • Demonstrate the use of obnoxious fishing methods in a small water body • Carry out fishing field trip	water body • Mend a torn net • Demonstrate the use of light in fishing in a small water body • Demonstrate the use of obnoxious fishing methods in a small water body • Carry out fishing field trip	
General Objective 4.0: Know how to apply safety measures during fishing operations.						
8-10	4.1 Explain the safety precaution required for fishing trip. 4.2 Explain the risks of being onboard. 4.3 List Personal Protective Equipment (PPE) for fishing operations. 4.4 Explain the importance of the use of PPE in fishing operation. 4.5 Explain the risks	• Discuss the safety precautions on fishing trip • Discuss the risks involved in fishing trip • Discuss the use of PPE	Whiteboard, lecture notes, Projector, Fisheries textbooks, Charts, Marker board, Journals, Instructional materials, etc.	• Practice swimming • Use lifejacket • Carryout net arrangement onboard a fishing boat • Carry out net handling while shooting and hauling for netting gears • Carry out none netting gear	Guide students to: • Practice swimming • Use lifejacket • Carryout net arrangement onboard a fishing boat • Carry out net handling while shooting and hauling for netting gears	PPE, Netting gears, Spear, Hook, Harpoon, Arrow.

	involved in fishing.			handling during shooting and retrieving • Wear some PPE	• Carry out non netting gear handling during shooting and retrieving.	
General Objective 5.0: Understand different methods of locating school/shoal of fish						
11-13	5.1 Explain the physical methods of fish detection. 5.2 Explain other scientific fish detection methods. 5.3 Explain the operational mode of a fish finder.	- Discuss different methods of fish detection in different water bodies - Discuss the operational mode of a fish finder	Whiteboard, lecture notes, Projector, Fisheries textbooks, Charts, Marker board, Journals, Instructional materials, etc.	- Observe some fishing sites - Identify parts of an echo sounder - Operate fish finder	Guide students to: - Carry out a sea trip, river or lakes tour - Demonstrate the use of echo sounder - Demonstrate the use of fish finder	Boat, Echo sounder.
General Objective 6.0 Know how best to handle fishing gears and catch onboard and at shore						
14-15	6.1 Explain best practices in handling fishing gear on board. 6.2 Explain the risks involved in poor handling of fishing gear. 6.3 Explain how to	- Explain the proper way of arranging gear before shooting - Discuss the handling of gear while hurling - Explain the importance of	Whiteboard, lecture notes, Projector, Fisheries textbooks, Charts, Marker board, Journals,	- Handle fishing gear properly. - Handle some fishing gear onboard - Demonstrate preservation of freshly caught fish.	Guide students to: - Demonstrate the benefits of proper handling - Demonstrate the danger inherent in poor handling - Show different	Boat, Net, Hook, Baskets, Kelp, Oil, Dyes, Blast freezer (<i>recommended</i>),

	preserve catch.	preservation	Instructional materials, etc.		storage and preservative ways of preserving gears shelf life • Demonstrate the use of some means of fish preservation	Fish hold, Ice boxes.
COURSE ASSESSMENT COURSE WORK (PRACTICAL BASED): 10% TESTS (PRACTICAL BASED): 10% PRACTICAL: 40% EXAMINATION (THEORY AND PRACTICAL): 40% TOTAL: 100%						



FISHERIES MANAGEMENT

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: FISHERIES MANAGEMENT	COURSE CODE: FIT 221	CONTACT HOURS: 4HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE: INTRODUCTION TO FISHERIES TECHNOLOGY	PRACTICAL: 3HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills for sustainable management and conservation of fisheries resources		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Know the principles and importance of fisheries management; 2.0 Know fisheries resources and their classification; 3.0 Understand fish population dynamics and stock assessment; 4.0 Know fisheries laws, regulations, conventions and instruments; 5.0 Understand fisheries management approaches; 6.0 Understand socio-economic aspects of fisheries.		

PROGRAMME: NATIONAL DIPLOMA FISHERIES TECHNOLOGY						
COURSE TITLE: FISHERIES MANAGEMENT		COURSE CODE: FIT 221		CONTACT HOURS: 4HOURS/WEEK		
		CREDIT UNIT: 4		THEORETICAL: 1 HOUR/WEEK		
YEAR: II SEMESTER: II		PRE-REQUISITE: INTRODUCTION TO AQUACULTURE		PRACTICAL: 3 HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills for sustainable management and conservation of fisheries resources						
GENERAL OBJECTIVE 1.0: Know the principles and importance of fisheries management.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1	1.1 Explain the meaning of fisheries management. 1.2 Explain the scope of fisheries management. 1.3 Explain the concepts of fisheries management. 1.4 Explain the importance of fisheries management. 1.5 Explain fisheries	• Discuss the meaning of fisheries management. • Discuss the scope of fisheries management. • Discuss the concepts of fisheries management • Discuss the importance of fisheries management • Explain fisheries	Textbooks, Encyclopedi a, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.			

	management systems. 1.6 List different fisheries management institutions.	management systems. • Discuss different fisheries management institutions				
General Objective 2.0: Know fisheries resources and their classification						
2	2.1 Explain inland and marine fisheries. 2.2 Explain aquaculture fisheries. 2.3 Explain renewable and non-renewable resources. 2.4 Explain importance of fisheries resources.	• Discuss inland and marine fisheries • Explain aquaculture fisheries • Discuss renewable and non-renewable resources • Discuss importance of fisheries resources.	Textbooks, Encyclopedi a, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.			
General Objective 3.0: Understand fish population dynamics and stock assessment						
3-6	3.1 Explain fish population dynamics. 3.2 Describe growth, mortality and recruitment concepts in	• Discuss fish population dynamics. • Describe growth, mortality and recruitment concepts in	Textbooks, Encyclopedi a, E-books, Journals, Magazines, Video clips, Charts,	• Carry out field trip to fish landing site and conduct the following: ➤ Collect data using different	Guide the students on a field trip to fish landing site and conduct the following: ➤ Collect data using different methods ➤ Apply simple	Fishing data sets, Weighing scale, Measuring rulers, Measuring tape.

	fisheries. 3.3 Explain stock assessment methods. 3.4 Explain Catch Per Unit Effort (CPUE). 3.5 Explain stock assessment tools.	fisheries - Explain stock assessment methods. - Describe Catch Per Unit Effort (CPUE). Explain stock assessment tools	Marker, Multimedia Projector, etc.	methods ➤ Apply simple stock assessment techniques ➤ Use of basic assessment tools ➤ Interpret population structure data	stock assessment techniques ➤ Use of basic assessment tools ➤ Interpret population structure data	
General Objective 4.0: Know fisheries laws and regulations, conventions and instruments						
7-10	4.1 Explain fisheries laws and regulations. 4.2 Explain the various fisheries laws: By-law, Edict, Act, Convention etc. 4.3 Explain national and international laws on fisheries. 4.4 Describe regulatory compliance measures. 4.5 Explain the principles of Code	- Discuss fisheries laws and regulations. - Explain the various fisheries laws: By-law, Edict, Act, Convention etc. - Discuss national and international laws on fisheries - Describe regulatory compliance measures. - Discuss the principles of Code	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Fisheries act, Fisheries Edict, UNCLOS (1982), UN Fish Stocks Agreement (2009),	Demonstrate enforcement procedures using drama and case scenario	Guide the students to dramatize enforcement procedures	Fisheries act, Fisheries Edict, UNCLOS (1982), UN Fish Stocks Agreement (2009), FAO, CCRF(1995)

	of Conduct for Responsible Fisheries (CCRF). 4.6 Explain the objectives of Code of Conduct for Responsible Fisheries (CCRF).	of Conduct for Responsible Fisheries (CCRF) • Discuss the objectives of Code of Conduct for Responsible Fisheries (CCRF)	FAO, CCRF(1995), etc.			
General Objective 5.0: Understand fisheries management approaches.						
10-11	5.1 Explain conservation principles. 5.2 Explain fish conservation methods 5.3 Explain protected areas and closed seasons. 5.4 Explain sustainable fishing practices.	• Discuss conservation principles (Precautionary approach, Ecosystem approach, Habitat restoration, Science-based) • Discuss fish conservation methods (Quotas, Closed seasons, Closed area, gear regulation, By-Catch Reduction) • Discuss protected areas and closed seasons.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Demonstrate responsible fishing methods using case scenarios • Demonstrate sustainable fishing practices using group role play	Guide the students to: • Demonstrate responsible fishing methods using case scenario • Demonstrate sustainable fishing practices using group role play	Video clips, Multimedia Projector.

		Discuss sustainable fishing practices				
General Objective 6.0: Understand socio-economic aspects of fisheries						
12-15	6.1 Explain socio-economic aspects of fisheries. 6.2 Explain sustainable fisheries livelihood approach. 6.3 Describe components of fisheries livelihoods. 6.4 Explain importance of fisheries to rural livelihoods. 6.5 Explain socio-economic roles of fisheries. 6.6 Explain climate change impacts on fisheries. 6.7 Describe adaptation strategies among artisanal fishers.	- Explain socio-economic aspects of fisheries - Explain sustainable fisheries livelihood approach - Explain importance of fisheries to rural livelihoods. - Discuss socio-economic roles of fisheries - Discuss climate change impact on fisheries - Discuss adaptation strategies among artisanal fishers	Textbooks, Encyclopedi a, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	- Classify livelihood components in a fisheries community - Carry out frame survey in fisheries community - Identify components of fisheries livelihoods in a fisheries community - Conduct field-based livelihood analysis in a fisheries community	Guide student to: - Classify livelihood components in a fisheries community - Carry out frame surveys in fisheries community - Identify components of fisheries livelihoods in a fisheries community - Conduct field-based livelihood analysis in a fisheries community	Note pads, Camera, GPS.

COURSE ASSESSMENT

COURSE WORK (PRACTICAL BASED): 10%

TESTS (PRACTICAL BASED): 10%

PRACTICAL: 40%

EXAMINATION (THEORY AND PRACTICAL): 40%

TOTAL: 100%



NON-FOOD FISH AND FISH PRODUCTS

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: NON-FOOD FISH AND FISH PRODUCTS	COURSE CODE: FIT 222	CONTACT HOURS: 3HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE: INTRODUCTION TO FISHERIES TECHNOLOGY	PRACTICAL: 2HOURS/WEEK
GOAL: This course is designed to equip students with the knowledge and skills required for the production, utilization and management of non-food fish products		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the concept and importance of non-food fish products; 2.0 Understand methods of processing fish waste into useful products; 3.0 Know the production of fish leather and fish glue; 4.0 Know pharmaceutical and industrial uses of fish by-products; 5.0 Understand cultural and esthetic fisheries.		

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY						
COURSE TITLE: NON-FOOD FISH AND FISH PRODUCTS		COURSE CODE: FIT 222		CONTACT HOURS: 3HOURS/WEEK		
		CREDIT UNIT: 3		THEORETICAL: 1 HOUR/WEEK		
YEAR: II SEMESTER: II		PRE-REQUISITE: INTRODUCTION TO FISHERIES TECHNOLOGY		PRACTICAL: 2 HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with the knowledge and skills required for the production, utilization and management of non-food fish products						
GENERAL OBJECTIVE 1.0: Understand the concept and importance of non-food fish products.						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1	1.1 Explain the concept of non-food fish products. 1.2 Explain the concept of finfish and shellfish. 1.3 Describe non-food fish products and their importance.	• Discuss the concept of non-food fish products. • Explain the concept of finfish and shellfish • Explain non-food fish products and their importance.	Textbooks, Encyclopedi a, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Identify non-food fisheries products • Identify finfish and shellfish	Guide student to: • Identify fisheries products • Recognize finfish and shellfish	Fish, Crab, Prawn, Clam, Mussel.

General Objective 2.0: Understand methods of processing fish waste into useful products						
2-5	2.1 Explain the economic importance of fishery by-products. 2.2 Describe fish meal production processes. 2.3 Explain fish oil extraction methods. 2.4 Explain fish hydrolysate. 2.5 Describe fish emulsion. 2.6 Explain chitin and chitosan. 2.7 Explain the uses of chitin and chitosan.	- Discuss the economic importance of fishery by-products - Explain fish meal production processes. - Explain fish oil extraction methods - Explain fish hydrolysate - Describe fish emulsion - Explain Chitin and chitosan - Discuss the uses of chitin and chitosan	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	- Carry out fish meal production - Conduct fish oil extraction	Guide students to: - Carry out fish meal production - Conduct fish oil extraction	Fish waste, Shrimp waste, Pot, Dryer, Grinder mill machine, Oil tray, Oil press.
General Objective 3.0: Know the production of fish leather and fish glue.						
6-7	3.1 Explain fish leather production. 3.2 Explain collagen extraction and processing. 3.3 Explain production of fish glue and gelatin. 3.4 Explain the use of fish skin in healing	- Discuss fish leather production - Discuss collagen extraction and processing - Explain production of fish glue and gelatin. - Describe the use of fish skin in healing	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector,	- Conduct tanning and leather preparation using fish skin - Carry out fish glue and gelatin production - Demonstrate the use of fish skin in	Guide student to: - Conduct tanning and leather preparation using fish skin - Demonstrate fish glue and gelatin production - Demonstrate the	Tilapia fish, Electric catfish, Lates, Shark skin, Shark fin.

	burns.	burns	etc.	treatment of burns	use of fish skin in treatment of burns	
General Objective 4.0: Know pharmaceutical and industrial uses of fish by-products.						
8-10	4.1 Explain pharmaceutical uses of fish products. 4.2 Explain cosmetic uses of fish products. 4.3 Explain omega-3 oils from fish. 4.4 Describe collagen and enzymes from fish.	- Discuss pharmaceutical uses of fish products - Describe cosmetic uses of fish products - Discuss omega-3 oils from fish - Describe collagen and enzymes from fish	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	- Identify pharmaceutical products from fish by-product - Identify industrial process of producing pharmaceutical products from fish by-products from video clips	Guide student to: - Identify pharmaceutical products from fish by-products - Identify industrial process of producing pharmaceutical products from fish by-products from video clips	Cosmetics Cod liver oil, Video clips, Multimedia projector.
General Objective 5.0: Understand cultural and esthetic fisheries						
11-15	5.1 Describe fish taxidermy. 5.2 Explain ornamental and craft products from fishery resources. 5.3 Explain cultural values of fish. 5.4 Explain	- Discuss fish taxidermy - Discuss ornamental and craft products from fishery resources. - Discuss cultural values of fish - Describe ornamental	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	- Carry out fish taxidermy - Produce simple ornamental items from fish products - Identify common ornamental fishes - Identify some fish use in pest control - Watch video clips	Guide student to: - Carry out fish taxidermy - Produce simple ornamental items from fish products. - Identify common ornamental fishes - Identify some fish	Fish, tanning agents, Fish scale, seashell Guppy, Mosquitofish, Killifish, Video clips, Multimedia projector, Goldfish, Zebrafish,

	ornamental fisheries. 5.5 Describe biological uses of fish in pest control. 5.6 Describe biological uses of fish in aquatic weed control.	fisheries • Explain biological uses of fish in pest control • Explain biological uses of fish in aquatic weed control		on how fish is used in aquatic weed control • Watch video clips on how fish is used in pest control	use in pest control • Watch video clips on how fish is used in aquatic weed control • Watch video clips on how fish is used in pest control	Platys, Koi carp.
COURSE ASSESSMENT COURSE WORK (PRACTICAL BASED): 10% TESTS (PRACTICAL BASED): 10% PRACTICAL: 40% EXAMINATION (THEORY AND PRACTICAL): 40% TOTAL: 100%						

FISH HEALTH AND DISEASES MANAGEMENT

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: FISH HEALTH AND DISEASES MANAGEMENT	COURSE CODE: FIT 223	CONTACT HOURS: 3HOURS/WEEK
	CREDIT UNIT: 3	THEORETICAL: 1HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE: INTRODUCTION TO AQUACULTURE	PRACTICAL: 2HOURS/WEEK
GOAL: This course is to equip students with knowledge and skills required for effective fish health monitoring, disease prevention, diagnosis, and control in aquaculture systems		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the concept of fish health management; 2.0 Know the common fish diseases, symptoms and their causative agents; 3.0 Know disease prevention, control and biosecurity measures; 4.0 Know how to conduct basic fish disease diagnosis; 5.0 Know how to apply chemotherapeutic and treatment methods safely; 6.0 Know stress factors affecting fish health.		

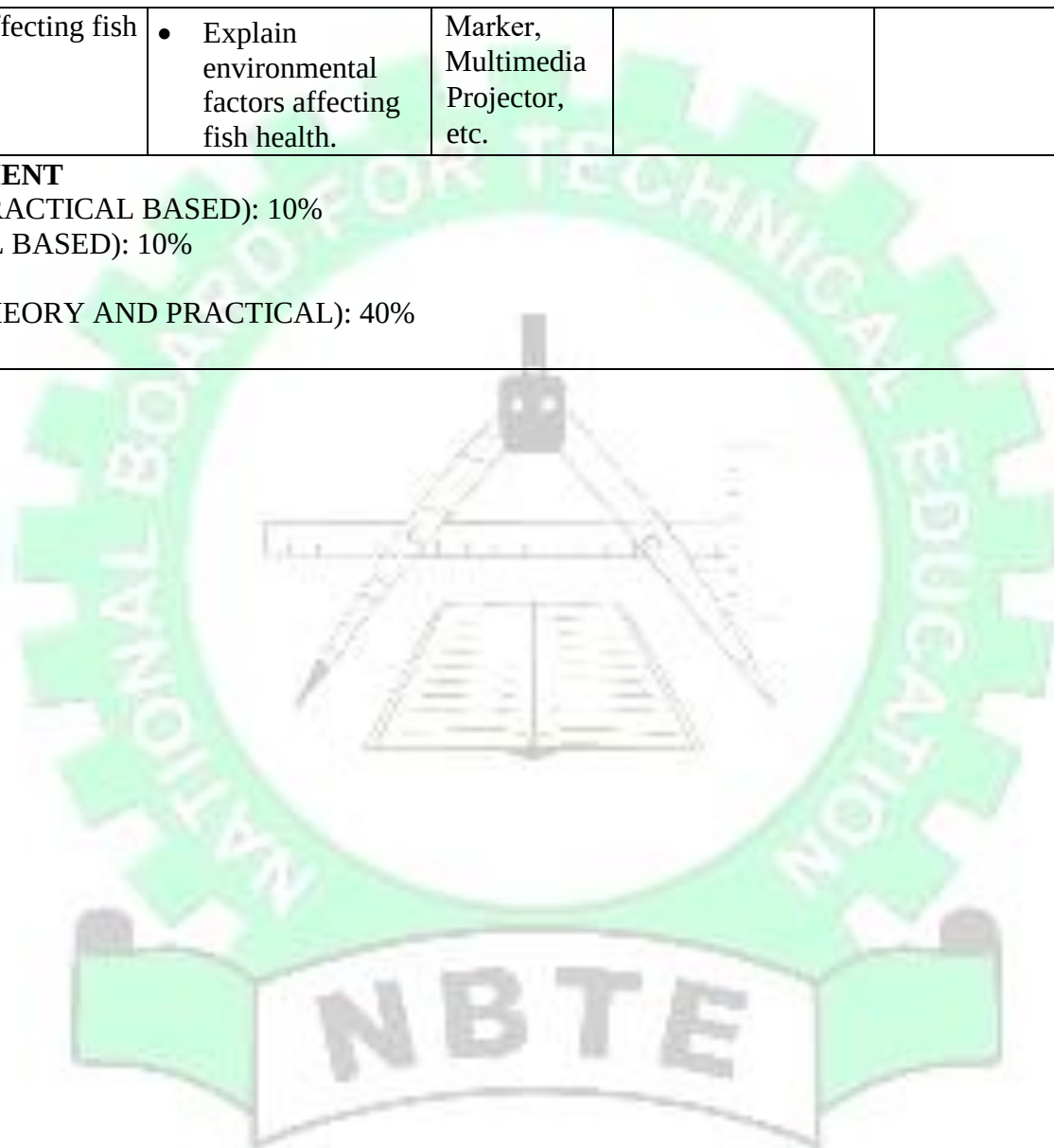
PROGRAMME: NATIONAL DIPLOMA FISHERIES TECHNOLOGY						
COURSE TITLE: FISH HEALTH AND DISEASES MANAGEMENT		COURSE CODE: FIT 223		CONTACT HOURS: 3HOURS/WEEK		
		CREDIT UNIT: 3		THEORETICAL: 1 HOUR/WEEK		
YEAR: II SEMESTER: II		PRE-REQUISITE: INTRODUCTION TO AQUACULTURE		PRACTICAL: 2HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is to equip students with knowledge and skills required for effective fish health monitoring, disease prevention, diagnosis, and control in aquaculture systems						
GENERAL OBJECTIVE 1.0 Understand the concept of fish health management						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1	1.1 Explain the meaning of fish health management. 1.2 Explain the meaning of fish health management. 1.3 Explain healthy and unhealthy fish conditions.	- Discuss fish health concepts. - Discuss the meaning and importance of fish health management. - Discuss healthy and unhealthy fish conditions.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, Biosecurity manuals, etc.	Identify healthy and unhealthy fish conditions.	Guide students to: Identify healthy and unhealthy fish conditions	Charts, Slides, Fish specimens, Disinfectants, PPE.
General Objective 2.0: Know the common fish diseases, symptoms and their causative agents.						
2-4	2.1 Explain major fish disease categories. 2.2 List common bacterial diseases.	- Discuss major fish disease categories. - Discuss common	Textbooks, Encyclopedia, E-books, Journals,	Identify common signs of bacterial diseases.	Guide student to: Identify common bacterial	Diagrams, Microscopic images, Fish sample,

	2.3 List common viral diseases of fish. 2.4 List common fungal diseases of fish. 2.5 List common parasitic disease of fish. 2.6 Explain symptoms of common fish diseases. 2.7 Explain diseases causative agents. 2.8 Explain environmental factors that causes diseases.	bacterial diseases (Columnaris, Aeromonas infections). • Discuss common viral diseases of fish • Discuss common fungal diseases of fish • Discuss common parasitic disease of fish • Explain symptoms of common fish diseases • Explain diseases causative agents	Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Identify signs of common viral diseases. • Identify signs of common fungal diseases. • Identify signs of common parasitic diseases.	diseases • Identify common viral diseases. • Identify common fungal diseases.	Hand lens, Charts.
General Objective 3.0: Know how to apply disease prevention, control and biosecurity measures						
5-7	3.1 Explain cultural method of disease prevention. 3.2 Explain vaccination in aquaculture. 3.3 Explain biosecurity measures. 3.4 Explain farm biosecurity	• Explain cultural method of disease prevention • Explain vaccination in aquaculture • Explain biosecurity measures.	Textbooks, Encyclopedi a, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia	• Demonstrate vaccination protocols. • Design vaccination plans. • Design biosecurity plans. • Conduct	Guide students to: • Demonstrate vaccination protocols. • Design vaccination plans. • Design biosecurity	Charts Biosecurity manual, Disinfectants, PPE.

	practices. 3.5 Explain hygiene standards in aquaculture facility.	- Discuss farm biosecurity practices - Explain hygiene standards in aquaculture facility.	Projector, etc	sanitation. Demonstrate disinfection methods	plans. - Conduct sanitation. - Demonstrate disinfection methods	
General Objective 4.0: Know how to conduct basic fish disease diagnosis.						
8-11				- Identify diagnostic features of bacteria disease. - Identify diagnostic features of fungal disease. - Identify diagnostic features of parasitic disease. - Identify nutritional diseases.	Guide students to: - Identify diagnostic features of bacteria disease - Identify diagnostic features of fungal disease - Identify diagnostic features of parasitic disease - Identify nutritional diseases	Fish sample, Charts, PPE, Microscope, Hand lens, Slides, Video clips.
General Objective 5.0: Know how to apply chemotherapeutic and treatment methods safely						
12-14	5.1 Explain use of chemotherapeutants.	Discuss use of chemotherapeutants.	Textbooks, Encyclopedias,	Carry out treatment of:	Guide students to carry out treatment of:	PPE, Drug samples,

	5.2 Explain safe drug usage. 5.3 Describe treatment of bacterial infections. 5.4 Explain treatment of viral infections. 5.5 Explain treatment of fungal infections. 5.6 Explain treatment of parasitic infections. 5.7 Explain treatment of nutritional diseases.	nts • Describe safe drug usage. • Describe treatment of bacterial infections. • Describe treatment of viral infections. • Describe treatment of fungal infections. • Describe treatment of parasitic infections. • Describe treatment of nutritional diseases	E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	➤ bacterial infections ➤ viral infections ➤ fungal infections ➤ parasitic infections ➤ nutritional diseases	➤ bacterial infections ➤ viral infections ➤ fungal infections ➤ parasitic infections ➤ nutritional diseases	Fish samples, Treatment guides, Formalin, Salt, Calculator.
General Objective 6.0: Know the stress factors affecting fish health.						
15	6.1 Explain stress and immunity in fish. 6.2 Explain the relationship between fish stress and disease outbreaks. 6.3 Explain environmental	• Explain stress and immunity in fish. • Explain the relationship between fish stress and disease outbreaks.	Textbooks, Encyclopedi a, E-books, Journals, Magazines, Video clips, Charts,			

	factors affecting fish health.	Explain environmental factors affecting fish health.	Marker, Multimedia Projector, etc.			
COURSE ASSESSMENT COURSE WORK (PRACTICAL BASED): 10% TESTS (PRACTICAL BASED): 10% PRACTICAL: 40% EXAMINATION (THEORY AND PRACTICAL): 40% TOTAL: 100%						



BASIC FISH HATCHERY PRACTICE

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY		
COURSE TITLE: BASIC FISH HATCHERY PRACTICE	COURSE CODE: FIT 224	CONTACT HOURS: 4HOURS/WEEK
	CREDIT UNIT: 4	THEORETICAL: 1 HOUR/WEEK
YEAR: II SEMESTER: II	PRE-REQUISITE: INTRODUCTION TO AQUACULTURE	PRACTICAL: 3HOURS/WEEK
GOAL: This course is designed to equip students with knowledge and skills required for fish hatchery practices for sustainable aquaculture development		
GENERAL OBJECTIVES: On completion of this course, the students should be able to: 1.0 Understand the principles and importance of fish hatchery management; 2.0 Know hatchery sanitation and biosecurity measures; 3.0 Know how to apply broodstock for breeding; 4.0 Know how to conduct induced breeding operations; 5.0 Know how to carry out larval and fry rearing operations; 6.0 Know how to monitor water quality parameters in hatchery systems; 7.0 Know common hatchery diseases and preventive measures; 8.0 Know how to maintain hatchery records and prepare simple production reports.		

PROGRAMME: NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY						
COURSE TITLE: BASIC FISH HATCHERY PRACTICE		COURSE CODE: FIT 224		CONTACT HOURS: 4HOURS/WEEK		
		CREDIT UNIT: 4		THEORETICAL: 1 HOUR/WEEK		
YEAR: II SEMESTER: II		PRE-REQUISITE: INTRODUCTION TO AQUACULTURE		PRACTICAL: 3 HOURS/WEEK		
COURSE SPECIFICATION: THEORETICAL AND PRACTICAL						
GOAL: This course is designed to equip students with knowledge and skills required for fish hatchery practices for sustainable aquaculture development						
GENERAL OBJECTIVE 1.0 Understand the principles and importance of fish hatchery management						
THEORETICAL CONTENT				PRACTICAL CONTENT		
Week	Specific Learning Outcome	Teacher’s Activities	Resources	Specific Learning Outcome	Teacher’s Activities	Resources
1	1.1 Explain the concept of fish hatchery practice. 1.2 Explain the importance of fish hatchery practice. 1.3 Explain different types of hatcheries. 1.4 Describe hatchery layout and components.	- Explain the concept of fish hatchery practice - Explain the importance of fish hatchery practice - Discuss different types of hatcheries. - Describe hatchery layout and components.	Textbooks, Encycloped ia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	- Identify hatchery systems from video clips - Identify hatchery tools and equipment	Guide student to: - Identify hatchery systems from video clips - Identify hatchery tools and equipment	Hatchery facility, Charts, Multimedia projector, Hatchery multimedia clips, Nets, bowls, hapa nets, incubators, tanks.
General Objective 2.0: Know hatchery sanitation and biosecurity measures						

2	2.1	Explain hatchery sanitation and biosecurity measures.	Explain hatchery sanitation and biosecurity measures.	Textbooks, Encycloped ia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	Demonstrate sanitation procedures in hatchery	Guide the student to: - Demonstrate sanitation procedures in hatchery - Demonstrate the use of protective devices - Demonstrate safe handling of chemicals and equipment.	Hatchery facility, Disinfectants, Brushes, PPE. First aid box.
	2.2	Explain occupational safety in hatchery operations.	Explain occupational safety in hatchery operations.		Demonstrate the use of protective devices		
	2.3	Explain hygiene, disinfection, and quarantine procedures.	Discuss hygiene, disinfection, and quarantine procedures		Demonstrate safe handling of chemicals and equipment.		
General Objective 3.0: Know how to apply broodstock for breeding							
3-4	3.1	Explain broodstock management principles.	Discuss broodstock management principles	Textbooks, Encycloped ia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	Identify healthy broodfish.	Guide students to: - Identify healthy broodfish. - Identify male and female broodstock	Catfish broodstock samples, Live broodfish, Charts.
	3.2	Describe male and female broodfish.	Describe male and female broodfish		Identify male and female broodstock		
	3.3	Explain broodstock selection.	Discuss broodstock selection				
	3.4	Explain broodstock feeding and conditioning.	Explain broodstock feeding and conditioning				
General Objective 4.0: Know how to conduct induced breeding operations							

4-8	4.1 Explain natural breeding method. 4.2 Explain induced breeding method. 4.3 Explain hormones used in induced breeding. 4.4 Explain stripping and fertilization procedures 4.5 Explain egg incubation systems. 4.6 Describe spawning methods in fish hatcheries.	• Explain natural breeding method • Explain induced breeding method • Describe hormones used in induced breeding • Discuss stripping and fertilization procedures • Discuss egg incubation systems • Describe spawning methods in fish hatcheries	Textbooks, Encycloped ia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc..	• Conduct breeding using natural method • Conduct breeding using induced method • Identify hormone types and dosages • Demonstrate broodstock handling and injection techniques • Demonstrate egg collection and fertilization • Conduct fish handling and mock injections • Set up incubation containers • Demonstrate incubator setup and operation. • Observe eggs and record hatchability	Guide the student to: • Conduct breeding using natural method • Conduct breeding using induced method • Identify hormone types and dosages • Demonstrate broodstock handling and injection techniques • Demonstrate egg collection and fertilization • Conduct fish handling and mock injections • Set up incubation containers • Demonstrate	Ovaprim samples, Syringes and needles, Broodfish, Anesthetic, Bowls, Feather, Saline solution, Incubators, Troughs, Aerators.
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					incubator setup and operation. • Observe eggs and record hatchability	
General Objective 5.0: Know how to carry out larval and fry rearing operations						
9-10	5.1 Explain embryo development stages. 5.2 Explain larval rearing techniques. 5.3 Explain fry nursing and grading. 5.4 Explain feeding practices in hatchery management. 5.5 Explain live feed production. 5.6 Explain larval feeding and management. 5.7 Explain feed types and feeding schedules	• Explain embryo development stages • Explain larval rearing techniques. • Explain fry nursing and grading. • Explain feeding practices in hatchery management. • Explain live feed production. • Discuss larval feeding and management. • Discuss feed types and feeding schedules	Textbooks, Encyclopaedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc..	• Feed larvae and observe behaviour. • Grade fry using graders. • Prepare feeds • Administer feeds to larva. • Participate in live feed culture	Guide students to: • Feed larvae and observe behaviour. • Grade fry using graders. • Prepare and administer feeds. • Participate in live feed culture	Microscope, Aerators, Fry tanks, live feed, starter feed. Fish graders, nursery tanks. Feed samples, feeding trays. Artemia cysts, culture tanks.
General Objective 6.0: Know how to monitor water quality parameters in hatchery systems.						

11-12	6.1 Explain hatchery water supply systems. 6.2 Explain water sources and treatment methods. 6.3 Explain hatchery water quality parameters.	• Explain hatchery water supply systems. • Discuss water sources and treatment methods • Discuss hatchery water quality parameters.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Identify water sources and components. • Measure water quality parameters • Interpret measurement of pH, temperature, and Dissolved Oxygen (DO) measurements.	Guide students to: • Identify water sources and components. • Measure water quality parameters • Demonstrate measurement of pH, temperature, DO.	Pumps, Pipes, Storage tanks. Water test kits, Thermometer, DO meter.
General Objective 7.0: Know common hatchery diseases and preventive measures.						
13-14	7.1 Explain symptoms and control measures. 7.2 Explain hatchery disease prevention measures. 7.3 Explain vaccination, quarantine, and sanitation.	• Explain symptoms and control measures • Explain hatchery disease prevention measures • Discuss vaccination, quarantine, and sanitation.	Textbooks, Encyclopedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Identify common hatchery diseases and parasites • Carry out biosecurity exercises.	Guide students to: • Identify common hatchery diseases and parasites • Carry out biosecurity exercises.	Microscopes, Diseased specimens. PPE, Disinfectants.
General Objective 8.0: Know how to maintain hatchery records and prepare simple production reports						

15	8.1 Explain records keeping 8.2 Explain hatchery record keeping procedures 8.3 Explain importance of records keeping in hatchery	• Discuss record keeping • Explain hatchery record keeping procedures • Discuss importance of records keeping in hatchery	Textbooks, Encyclopaedia, E-books, Journals, Magazines, Video clips, Charts, Marker, Multimedia Projector, etc.	• Carry out hatchery documentation and data recording.	Guide students to: • Demonstrate hatchery documentation and data recording.	Record books, Sample forms.
COURSE ASSESSMENT COURSE WORK (PRACTICAL BASED): 10% TESTS (PRACTICAL BASED): 10% PRACTICAL: 40% EXAMINATION (THEORY AND PRACTICAL): 40% TOTAL: 100%						

LIST OF FACILITIES/EQUIPMENT NATIONAL DIPLOMA IN FISHERIES TECHNOLOGY

1.0 BIOLOGY/FISH BIOLOGY/ MICROBIOLOGY See Science Laboratory Technology Curriculum

2.0 CHEMISTRY/ BIOCHEMISTRY See Science Laboratory Technology Curriculum

3.0 PHYSICS See Science Laboratory Technology Curriculum

4.0 AUDIO VISUALS

S/N	ITEM	QUANTITY
1	Cameras	2
2	Flood Light	2
3	Camera Tripod Stand	1
4	Video Record/Player	1
5	Video Camera	1
6	Multimedia Projector	2
7	Magnetic Board	1
8	Public Address System	1
9	Television	1

5.0 METEOROLOGICAL STATION

S/N	ITEM	QUANTITY
1.	Stevenson's Screen	1
2.	Them Hydrographs	1
3.	Maximum and Minimum Thermometer	2
4.	Measuring Glasses	2
5.	Wind Vane	1
6.	Anemometer	2
7.	Evaporimeters	2
8.	Hygrometers	2
9.	Barometers	2
10.	Digital Meteorological Station	1
11.	Rain Gauge	1

6.0 NET LOFT (GEAR AND CRAFT)

S/N	ITEM	QUANTITY
1.	Space	For 40 students
2.	Model Gillnets	1
3.	Model Trammel Net	1
4.	Model Castnet	1
5.	Model Beach Seine Net	1
6.	Model Purse Seine Net	1 of each
7.	Model Traps (Various)	1
8.	Model Hook And Line	1
9.	Model Mid- Water Trawl	1
10.	Model Bottom Trawl	1
11.	Model Surface Trawl	1
12.	Model Lift Fishing Net	2 of each
13.	Scoop Nets	1
14.	Pole And Lines	1
15.	Fyke Nets	1
16.	Clap Nets	1
17.	Dragnet	1
18.	Spear	1
19.	Harpoon	1
20.	Angling	1
21.	Hook Packet	1 of each
22.	Nylon Ropes	1 of each
23.	Mounting Twine	1 roll of each
24.	Fisherman Needles	1 packet of each
25.	Bundles Of Net	210 ^{D/3} to 60
26.	Knife	2 packets
27.	Razor Blade	1 packet
28.	Lead Sinker	assorted
29.	Floater	assorted

7.0 FISH FEED MILL

S/N	ITEM	QUANTITY
1.	Grinding Machine	2
2.	Sieves	10
3.	Mixer	1
4.	Black Soldier Fly (Bsf)	1
5.	Pelleting Machine	1
6.	Extruder Machine	1
7.	Bowls	10(different sizes)
8.	Weighing Balance	1
9.	Inventory Sheets	1
10.	Calculators	2
11.	Feed Storage Space/Packaging Space	
12.	Dryer	1

8.0 BLACK SOLDIER FLY (BSF)

S/N	ITEM	QUANTITY
1.	Breeding Tray	10
2.	Net Cages	5
3.	Insect Sprinklers	1
4.	Sieving Basket	2
5.	Culture Trough	10
6.	Egg Crates	10

9.0 FISH FARM (AQUACULTURE)

S/N	ITEM	QUANTITY
1.	Hatchery Troughs	6
2.	Air Pumps And Accessories	6
3.	Sechi Disc	5
4.	Ph Meter	2
5.	Portable Field Analysis Kit	2
6.	Ruttner Water Sampler	1

7.	Eeckman Grab	1
8.	Portable Oxygen Meter	2
9.	Aerators	assorted
10.	Thermometer	10
11.	Sieine Net	5
12.	Sample Bottles	10
13.	Aquarium (Various Sizes	5
14.	Mac Donald's Jar (For Including Egg)	10
15.	Incubator	1
16.	Cell Counting Chamber	10
17.	Ocular Micrometer	10
18.	Binocular Microscope	10
19.	Water Test Kit	1
20.	Ovaprim /Ovatide Syringe and Any Other Types Of Synthetic Hormone Models of Recirculatory Aquaculture System (RAS)	1
21.	Models Of Fish Cages And Pens	
22.	Rain Boot	5
23.	Blower	1
24.	Hapa Net	5
25.		

10.0 FISH PROCESSING FACILITY

S/N	ITEM	QUANTITY
1.	Cutting Knives	40
2.	Measuring Boards	40
3.	Weighing Balances	2
4.	Hand Gloves	40
5.	Headnet	40
6.	Oven	2
7.	Smoking Kilns (Different Types)	4
8.	Deep Freezers	1
9.	Fish Drying Rack	4

10.	Fish Boxes	4
11.	Salting Trays/ Basins	5
12.	Cold Room	1
13.	Fryer	2
14.	Personal Protective Equipment Ppe	40
15.	Packaging Materials	2 packs
16.	Mortar	1

11.0 FISH MUSEUM

S/N	ITEM	QUANTITY
1.	Aquiria	4
2.	Fish Skeleton	10
3.	Preserved Specimen	assorted

12.0 FISH PONDS

S/N	ITEM	QUANTITY
1.	Concrete Tanks	6
2.	Earthen Ponds	10
3.	Fibre/Plastic Tanks	10
4.	Collapsible Polythene Tanks	10
5.	Cage and Pen	5
6.	Tarpaulin Tanks	5

13.0 WORKSHOPS (BOAT BUILDING, AND MAINTENANCE ETC)

13.1 WOOD WORKSHOP

S/N	ITEM	QUANTITY
1.	Bond Saw	1
2.	Cross Cutting Circular Saw	1
3.	Thickening Planer	1
4.	Spindle Molding Machine	1
5.	Mortising Machine	1
6.	Drilling Machine	1

7.	Standing Machine	1
8.	Simple Platen	1
9.	Grading Machine	1
10.	Router	1
11.	Wood Chippe	1
12.	Lathe (Wood Machine)	1
13.	Dimension Sawing Machine	1
14.	Hand Tool	1
15.	Saw, Chisel, Try Square, Guaguesrule, Screwdrivers, Set Of Drill Bit, Hammer Mallets Pincers, Oilstone Planners Etc	12
16.	First Aid Box	1
17.	Model Boats	Assorted
18.	Model Aquaria	Assorted

13.2 METAL WORKSHOP

S/N	ITEM	QUANTITY
1.	Lathe	3
2.	Pillar Drilling Machine	2
3.	Bench Drilling Machine Power Sawing Machine	1
4.	Milling Machine	3
5.	Air Compressor	1
6.	Pedestral Grinding Machine	1
7.	Pipe Bender	2
8.	Hydraulic Pipe Machine	2
9.	Hydraulic Pipe Press Machine	2
10.	Anvil	1
11.	Sheet Metal; Shearing Machine	1
12.	(Guilotine)Blacksmith'S Hearth	3
13.	Bench Grinding Machine	3
14.	Inside Micrometer	3
15.	Out Side Micrometer	2
16.	Stock And Die Set	2

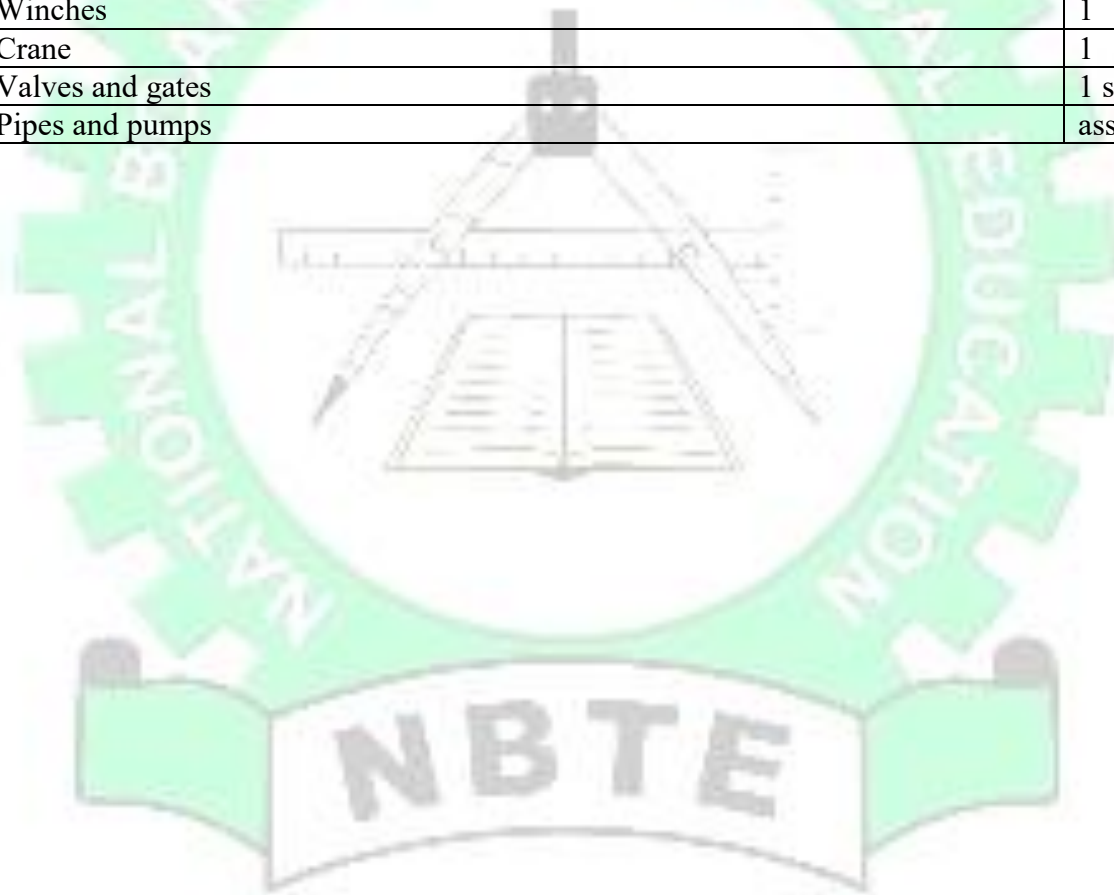
17.	Drill Set	5
18.	Chain Block	5
19.	Electrical Hand Drill	5
20.	Depth Gauges	5
21.	Panel Beating Tools (Bench State)	5
22.	Breast Drill	2
23.	Hack Saw Frames	5
24.	Toque Wrench	3
25.	Plate Rolling Machine	10
26.	Swage Block B27/0120	2
27.	Surface Plate	
28.	Scribers	2
29.	Steel Rule	2
30.	Mallet Set	10
31.	Pipe Screw Threading Machine	10
32.	Wire Brush	10
33.	Dressing Wheels	1
34.	Tong	5
35.	Try Square	2
36.	Files	3
37.	Blow Torch	3
38.	Soldering Iron Tin Snips	20
39.	Soldering Flux	3
40.	Acid Core Wire Solder	3
41.	Resin-Core Wire Solder	3
42.	Emery Cloth	3
43.	Sand Paper	3
44.	Cotton Waste	3
45.	Oxygen And Acetylene Bottles	3
46.	Model Boats	30sheets
47.	Outboard Engines	3 bundles
48.	Oxygen And Acetylene Regulator	3

49.	Oxyacetylene Welding Cutting Outfit	3
50.	Oxygen and Acetylene Hoses	complete
51.	Welding Goggles	3
52.	Cylinder Wrenches	3
53.	Spark Lighter	3
54.	Welding Rods	3 bundles
55.	Welding Fluxes	30
56.	Bracing Rods Model	3

14.0 NAVIGATION AND SEAMANSHIP

S/N	ITEM	QUANTITY
1.	Rules of the road instructional display panel with cable and switch board	1 unit
2.	International code flags display board	1 unit
3.	Binoculars	24
4.	Compass	10
5.	Azimuth mirror	1
6.	Baader planetarium	1
7.	Walker, log	1
8.	Barometer (aneroid)	1
9.	Plastic station pointer	1
10.	Original station pointer	1
11.	Pelorus	1
12.	Instructional magnet board with model	1
13.	Plastic sextants	1
14.	Pyrotechnics box	1
15.	Life buoys/ jacket	1
16.	Bouyage system display	1
17.	Bouyage system model	1 set
18.	International code flags	1
19.	Fog signaling bell	1
20.	Fishing vessels	1
21.	Instructional model life raft (inflated	1 of each

22.	Echo sounder	1
23.	Sonar	2
24.	Tide	3 type
25.	Navigational (different location)	2
26.	Nautical almanac	1
27.	Fish star finder	1 each
28.	GPS	1
29.	Grinder	1
30.	Winches	1
31.	Crane	1
32.	Valves and gates	1 set
33.	Pipes and pumps	assorted



LISTS OF PARTICIPANTS

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