THE UNIVERSITY OF ZAMBIA

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF ANIMAL SCIENCE

INTEGRATED AQUACULTURE AND FISH NUTRITION (AGA 5562) FINAL EXAMINATION

END OF SECOND HALF 2018/2019 ACADEMIC YEAR

DURATION: 3 HOURS **DATE: 30/11/2018 (pm).** **MARKS: 100**

INSTRUCTIONS:

1) There are two sections in this paper, Section A and Section B.

2) Section A has two (2) questions. **Answer all questions in section.**

3) Section B has four (4) questions, **answer any three question in this section.**

4) Start answering each question on a separate page.

5) Make sure to write your computer number on each page of your answer sheet.

SECTION A (Answer all questions)

1. Explain the following terms as applied in Integrated Aquaculture (20 marks)
   (a) Sustainable aquaculture
   (b) Benthos
   (c) Pond primary productivity
   (d) Eutrophication
   (e) Biogas
   (f) Semi-intensive aquaculture
   (g) Fish ranching
   (h) Recirculatory Aquaculture System

2. There are many ways a farmer can use to formulate fish feed. One of them is by use of computer least cost formulation programs such as Winfeed, Mxit etc.
   (a) Explain to the farmer what information needs to be provided in order for them to use the program? (8 marks)
   (b) Explain five (5) of the recommended guidelines for handling and storage of dry pelleted fish feed from time of purchase. (10 marks)
   (c) Under what condition is supplemental feed given to fish? (2 marks)

SECTION B (Choose any three (3) questions)

3. Small holder farmers in Zambia can easily integrate fish farming with other agricultural enterprises on their farms. This helps them to achieve more economically viable and environmentally sustainable farming systems.
   (a) As an animal scientist equipped with aquacultural expertise, discuss the design and management of fish/livestock structures that the farmers can use on the farm. (12 marks)
   (b) Explain four (4) indicators the farmers can use to know when too much manure has been loaded into the fish pond (4 marks).
   (c) What are the ideal application rates of manure (from cattle, goats, pigs and chicken) you would recommend to the farmers? (4 marks)

4. Mr. Phiri is a prospective fish farmer on the Copper-belt province. Having limited resources at his disposal (land and water), he plans on venturing into Intensive Aquaculture Production in order to meet the fish demand in his province.

(a) Explain to Mr. Phiri the characteristics of Intensive Aquaculture Production. (8 marks)

(b) What are the different components of a Recirculatory Aquaculture System (RAS) and what is their role in the system? (8 marks)

(c) What is the significance of the use of Geographical Information Systems (GIS) in

THE UNIVERSITY OF ZAMBIA
SCHOOL OF AGRICULTURAL SCIENCES

2016 ACADEMIC YEAR
FINAL EXAMINATIONS

AGA 4531: INTRODUCTION TO AQUACULTURE
THEORY PAPER

TIME: THREE HOURS

INSTRUCTIONS: ANSWER **FIVE** QUESTIONS: ANSWER QUESTIONS **1** AND **2** IN **SECTION A** AND QUESTIONS **5** AND **6** FROM **SECTIO B** AND A **FIFTH** QUESTION FROM **EITHER** SECTION. ILLUSTRATE YOUR ANSWERS WHERE NECESSARY. USE **SEPERATE** EXAMINATION ANSWER BOOKS FOR **EACH** SECTION

SECTION A

1. Discuss the following terms and concepts in relation to fish growth and taxonomy:
   (a) Type specimen.
   (b) Clupeidae
   (c) Perciformis.
   (d) Growth coefficient (k).
   (e) Fulton's condition factor.

2. A fish specimen was caught when it had total length of 35.7 cm and scale length of 4.7 cm. Using annual rigs on scales, age was determined to be three (3) years. The first and second annual rings on the scale were 2.2 cm and 3.8 cm. Given that:

$$L_n/L = S_n/S$$

   (a) Estimate total fish lengths at ages of 1 and 2 years.
   (b) Discuss advantages of computing fish growth curves using annual rings compared to the tagging methods.

3. (a) Summarise key identification features and characteristics of the family Cichlidae.
   (b) Name any four Cichlid species and highlight the significance of the family in aquaculture.
   (c) Discuss advantages and difficulties associated with farming Cichlids.

4. (a) Describe prominent characteristics of the family Clariidae.
   (b) Summarise difficulties associated with farming Clarids.

SECTION B

5. Describe the breeding biology of Tilapiines with reference to *Tilapia rendalli* and *Oreochromis andersonii* emphasizing on their similarities and differences.

6. As an Aquaculture Research Officer attending an aquaculture conference you are requested to present a paper on Tilapia breeding. Summarise your presentation showing how prolific breeding behaviour of Tilapiines can be controlled.

7. Describe the steps that an aquaculturist could follow during induced breeding of carp fish in a hatchery.

8. Explain the important procedures that must be followed in the transportation fingerlings from Chilanga Government fish farm to farmers' ponds in Kasama Farming Block.

END OF THE EXAMINATION

THE UNIVERSITY OF ZAMBIA

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF ANIMAL SCIENCE

Introduction to Aquaculture (AGA 4531)

Mid-Term Test

Date: 03/05/2019 Time: 14:00hrs – 15:00hrs

Instructions;

1. Answer all questions
2. Indicate your name and computer number on top of the first page

Name: NGOZA KUMWENDA ..... Comp. # ..15034097.....

* 1. Explain the difference between Aquaculture and Fish Farming. (4marks)

Aquaculture is the growing of living organisms i.e plant and animals in water while fish is specifically the growing and managing of fish species. (it is a branch of Aquaculture) aquatic organisms. 4

2. Explain any two nutritional qualities of aquaculture products and by products. (4marks)

1) Aquaculture products and by products are rich in proteins. They are good source of protein. They have a high percentage protein which are used for the growth of different organis & good balance of Protein 2

2) Aquaculture produces and by products are a good source of iron. Iron is need in the formation of blood. Have comple number of amino acids

* 3. The common breams which are cultured in Zambia include Nile tilapia, the Kafue bream and Red-breast bream. Give the scientific names of the three breams. (3 marks)

a) Nile tilapia - Oreochromis niloticus 3

b) Kafue bream - Oreochromus andersonii

c) Red-breast bream - Tilapia rendalli

4. A farmer who maintains high stocking densities of fish runs the risk of ammonia toxicity. What are the sources of ammonia in a fish pond? (2 marks)

Water / By-Product from protein metabolism
Bacterial
^ Decomposition of organic matter /

5. (a) What are the two forms of ammonia that exist in a pond? (2 marks)

NH_4^+ (Nitrate) and NH_3 (Nitrite) /
Ionized and (g) Unionized ammonia

(b) From your answer in (a), which one of the two is the most toxic to fish? (1 marks)

NH_3 (Nitrite) Unionized ammonia ½
(g)

6. Circle or tick the correct answer.
As the water temperature ……/…… (increases, decrease), the solubility of Oxygen…… (increases, decreases). (2 marks) 2

*7. What are the benefits of fish farming in comparison to other agricultural practices? (12 marks)

- ~~fish farming~~ bring ~~produces~~ more profit per unit area compared to other agricultural practices.
- Fish farming can be done on a relative piece of land that is not considered fertile for other griculdeal practices.
- Fish farming easier to can be integrated well with other agricultural practices.
- Fish can be cultured or farmed. /

8

- Fish farming can be done throughout the year if well managed compared to other agricultural practices which are seasonal.

- Fish farming is on high demand as the current amount of fish being produced in not enough to meet the require amount that each person is supposed to consume in the country, therefore the need for fish farming compared to other agricultural practices.
- Fish farming is an investment compared to other agricultural practices.

21.5/30

NGO2A

THE UNIVERSITY OF ZAMBIA

UNIVERSITY EXAMINATIONS – JULY 2019

AGA 4531
INTRODUCTION TO AQUACULTURE

DURATION: 3 HOURS **DATE: 11/07/2019 (am)** **MARKS: 100**

INSTRUCTIONS:

1) There are two sections in this paper, Section A and Section B.

2) Section A has two (2) questions. **Answer ALL questions in this section.**

3) Section B has four (4) questions, **answer ANY THREE questions in this section.**

4) Start answering each question on a separate page.

5) Make sure to write your computer number on each page of your answer sheet.

SECTION A (Answer ALL questions)

1. Explain the following terms as applied in Introduction to Aquaculture: **[10 marks]**
   a. Aquaculture [2 marks]
   b. Biological Oxygen Demand [2 marks]
   c. Anadromous fish migration [2 marks]
   d. Systematics [2 marks]
   e. ICZN [2 marks]

2. As a student who has passed through an Introduction to Aquaculture course, you have been invited by an NGO to educate some rural farmers who plan on venturing into fish farming. Answer the following questions: **[30 marks]**

   a. Explain to the farmers the factors they need to take into consideration when selecting a site to put up fish ponds. [20 marks]
   b. Briefly explain what is involved in the water permeability test. [10 marks]

SECTION B (Choose any THREE (3) questions)

3. Answer the following questions: **[20 marks]**

   a. A group of youths in Sinazongwe are planning to apply for a loan with the aim of venturing into aquaculture. As aquaculture in Zambia is mostly focused on farming of tilapia, you have been given a chance to explain to the youths about other forms of aquaculture, in particular, crocodile and frog farming. Briefly explain to them what is involved and benefits of crocodile and frog farming. [12 marks]

   b. What is the main product and the by-products derived from crocodile farming? [4 marks]

   c. As part of the AGA 4531 course, you were assigned to research on a particular specie of fish for your term paper. Give the common and scientific name of the specie that you worked on (choose one specie if you looked at more than one). [4 marks]

- Crocodile meat
- oil
- Skin
- ~~Bones~~ Scales

2

Salmon
Attantic Salmon

salmo
salar
Le salar

4. Answer the following questions: **[20 marks]**

a. Mr. Phiri is a fish farmer who wishes to understand different concepts regarding the aquatic environment. Explain to him what the aquatic ecosystem comprises of and its characteristics. [10 marks]

b. Give any five (5) causes of mortality during fish transportation. [5 marks]

c. What is the significance of fish migration? [5 marks]

5. Culture water determines the success or failure of an aquaculture enterprise to a great extent. This is because fish are totally dependent on water to breathe, feed and grow, excrete wastes, maintain a salt balance and reproduce. Answer the following questions: **[20 marks]**

a. Define and discuss any six (6) water quality parameters that affect the growth of fish in a pond. [12 marks]

b. For each of the parameter discussed in (a.), what is the desirable/optimum range required by tilapia. [6 marks]

c. Name an instrument that can be used to check the turbidity of pond water. [2 marks]

6. Understanding the biology of fish plays a critical role in maximizing fish