KAPASA MAKASA UNIVERSITY

SCHOOL OF APPLIED SCIENCES AND EDUCATION

DEPARTMENT OF AGRICULTURE AND AQUATIC SCIENCES

2024 SESSIONAL EXAMINATION

[FA 330]

[FISH NUTRITION AND FEED TECHNOLOGY]

[DATE: 14 OCTOBER 2024]
[TIME: 9:00-12:00 Hrs]

Instructions:

1. There are seven questions in total.
2. Answer a Compulsory Question (CQ) in **Section A.**
3. Answer **four (4) questions from Section B.**
4. There are 100 marks allocated to this paper.
5. Each question carries **20 marks**.
6. Where possible, illustrate your answers.
7. Time allowed: **Three (3) hours.**
8. When answering follow further instructions in the answer book.

[FISH NUTRITION AND FEED TECHNOLOGY]

SECTION A:

COMPULSORY QUESTION (CQ)

Question One

a) Briefly outline the importance of fish nutrition and technology, and explain how advancements in this area contribute to the growth, health, sustainability, and economic efficiency of aquaculture. **[6 Marks]**

b) Briefly explain the fundamentals of fish nutrition, focusing on the relationship between nutrition and fish growth. **[5 Marks]**

c) Explain natural feeds and artificial feeds, highlighting the differences and their roles in fish nutrition. **[4 Marks]**

d) As a graduate trainee, your supervisor, Mr. Gunduza, has asked you to plan the feed quantity for Thursday. The pond has 5600 fish with an average body weight (ABW) of 65g. Fish are fed three times a day at 3-5% of their body weight. Calculate the total feed required and the feed ration for each feeding time. **[5 Marks]**

SECTION B: ANSWER ANY FOUR (4) QUESTIONS FROM THIS SECTION

Question Two

a) Briefly describe one macronutrient, detailing its properties, classification, and functions, and providing examples of its sources. **[7 Marks]**

b) List at least three essential amino acids that fish frequently need and limiting that must supplemented in fish feeds. **[2 Marks]**

c) Discuss how protein requirements vary among different fish species and explain the optimal protein level for practical diets in herbivorous and omnivorous fish used in pond feedings. **[5 Marks]**

d) Explain one common nutritional deficiency disorder in fish, including their symptoms and effects. **[6 Marks]**

Question Three

a) What are fish feed ingredients? Briefly explain how they are classified and provide examples. **[5 Marks]**

b) List five (5) ingredients that are commonly used in fish diet formulation. **[4 Marks]**

c) What are alternative feed ingredients? Give examples. **[3 Marks]**

d) What are fish feed additives? **[3 Marks]**

e) List and give a brief description of any two (2) types of feed additives you know. **[6 marks]**

Question Four

a) Why are binders necessary in fish diets? **[3 Marks]**

b) Why are vitamin/mineral premixes important in fish feeds? **[3 Marks]**

c) Micro-nutrients are required for normal growth, reproduction, health, and maintenance of fish metabolism. Describe one category of micronutrient you are familiar with and provide examples of its sources. **[7 Marks]**

d) What are anti-nutritional factors? Provide one example, explain its effect on fish health, and describe how it can be eliminated from feed ingredients. **[7 Marks]**

Question Five

a) What are the steps involved in fish feed formulation? **[5 Marks]**

b) List three methods used in fish feed formulation. **[3 Marks]**

c) As a graduate trainee, Mr. Dumbwiza has tasked you with formulating feed for his tilapia using soybean meal (44% CP), fish meal (57% CP), and maize meal (10.2% CP). The target is a feed containing 35% crude protein (CP). Using Pearson's square method, show how you would formulate this diet. **[7 Marks]**

d) State the advantages of extrusion in fish feed manufacturing? **[5 Marks]**

Question Six

a) List the steps involved in feed manufacturing. **[2 Marks]**

b) What parameters are used to evaluate fish feed efficiency? **[3 Marks]**

c) Mr. Tombwe cultured his *Oreochromis andersonii* for 5 months. He stocked 5900 fingerlings weighing 21g. At the end of the 5 months, he harvested 5785 fish weighing 400g each and the total feed used was 120 bags weighing 25kg each. Calculate the following:

i) Feed Conversion Ratio (FCR). **[4 Marks]**

ii) Feed Efficiency Ratio (FER). **[2 Marks]**

iii) Average Daily Gain (ADG). **[2 Marks]**

iv) Residual Feed Intake (RFI) if the predicted intake is 0.004kg/day.**[3 Marks]**

d) Mr. Polopela plans to produce 6,090 kg of fish and has three feed options: Aller Aqua (FCR=1.12, price=K31/kg), Novatek (FCR=1.41, price=K29/kg), and Namfeeds (FCR=1.71, price=K27/kg). Calculate which feed brand will result in the lowest total feed cost based on the amount of feed required. **[4 Marks]**

Question Seven

a) Feed can be divided into several groups or categories based on several factors. List two (2) categories of fish feeds you know. **[3 marks]**

b) Provide a brief explanation of precision nutrition and its importance in aquaculture. **[5 marks]**

c) Explain nutrigenomics and its relevance to improving aquaculture production. **[6 marks]**

d) Discuss the role of artificial intelligence in enhancing fish nutrition and feed technology. **[6 marks]**

THE END

KAPASA MAKASA UNIVERSITY

School of Applied Science and Open Learning

DEPARTMENT OF AGRICULTURE AND AQUATIC SCIENCE

EXAMINATION

COURSE : FISH HEALTH AND DISEASE

CODE : FA 320

DATE : 30th OCTOBER, 2024

INSTRUCTIONS

1. Write your name and ID correctly on the answer booklet provided.
2. Answer Five (5) questions and question Seven is compulsory.
3. There are SEVEN questions in this paper
4. Marks are indicated at the end of each question

Question 1

Which of the following is a common viral disease in fish?
a) Loiasis
b) Viral Hemorrhagic Septicemia (VHS)
c) Lyme disease
d) Rabies

What is the primary causative agent of columnaris disease in fish?
a) Virus
b) Bacteria
c) Parasite
d) Fungi

(20 marks)

Question 2

What are some common symptoms of mycobacterial infections in fish? How do these infections typically affect fish physiology? *(20 marks)*

Question 3

Which of the following practices below can help prevent the spread of fish diseases in aquaculture? And explain your answer?
a) Overcrowding tanks
b) Quarantine new fish before introduction
c) Using untreated water sources
d) Feeding fish with high-density feed

(20 marks)

Question 4

Explain the importance of biosecurity measures in aquaculture. Provide at least three specific examples? *(20 marks)*

Question 5

Evaluate the effectiveness of different treatment options for external parasites (such as lice or flukes) in fish. Compare and contrast at least two treatment methods. *(20 marks)*

Question 6

You are tasked with conducting a disease survey in a local fish population. Outline the sampling strategy you would use and the factors you would consider in your assessment. *(20 marks)*

Question 7

Given a scenario where a farmer reports high mortality rates in a specific fish species, outline a step-by-step approach to diagnose the issue. What diagnostic tools and techniques would you employ? *(20 marks)*

KAPASA MAKASA UNIVERSITY

FA 300

AQUATIC ECOLOGY AND ENVIRONMENT

(09:00-12:00)

Date 17th October, 2024

INSTRUCTIONS

There are seven (7) questions in this this paper

Answer ANY FIVE using the answer booklet provided

QUESTION 1

a) What is an aquatic ecosystem? [2 marks]

b) Explain, with examples, three (3) aquatic ecosystems [18 marks]

QUESTION 2

Fish species migration can be categorized into two groups – migratory and non-migratory. Define fish migration and outline its four (4) advantages

[20 marks]

QUESTION 3

Write short notes on of the following:

a) Rheotaxis

b) Niche differentiation

c) Size selective predation

[20 marks]

QUESTION 4

Foraging is an adaptative behavior trait that is key to the survival of fish species. Describe four merits of foraging. [20 marks]

QUES TION 5

What is fish diversity? Discuss the five (5) navigational techniques employed by migratory fish.

[20 marks]

QUESTION 6

Fish is waterborne organism. Discuss four (4) characteristics that make it survive in water environments.

[20 marks]

QUESTION 7

Globally, fish is known to undergo lot of developmental stage. Discuss allopatric speciation as it relates to fish.

[20 marks]

KAPASA MAKASA UNIVERSITY

FACULTY OF APPLIED SCIENCE AND OPEN LEARNING

DEPARTMENT OF AGRICULTURE AND AQUATIC SCIENCES

FISHING GEARS & TECHNOLOGY – FA360

END OF YEAR FINAL SESSIONAL EXAMINATION 2024

25th OCTOBER 2024

INSTRUCTIONS TO CANDIDATES

1. Time allowed is **THREE (3) HOURS**
2. Remember to write your student identity number (SIN) on the provided answer sheets
3. All questions carry equal marks **(20 Marks)**
4. Question one in (Section A) is **COMPULSORY**
5. Attempt a total of **FOUR optional** questions in Section B

CELLPHONES AND OTHER RELATED GAGETS ARE NOT ALLOWED IN THE EXAMINATION ROOM

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SECTION A - Compulsory

This section contains only **one compulsory** question which you are required to attempt in addition to the other four (4) in Section B.

QUESTION ONE (20marks)

i. What is a monofilament net? (***2 marks***)

ii. The Zambian government under the auspices of the Department of Fisheries (DoF) has prohibited the use of monofilament nets, regardless of the mesh size and net construction. Most monofilament nets are made of a synthetic polymer called polyamide (PA) or Nylon. Using your knowledge on netting materials and specifically synthetic fibers, give four (4) reasons as to why the step being taken by the Department of Fisheries for complete ban of monofilament nets is correct in ecological terms (***8 marks***).

iii. Natural fibers as netting materials have been cited to have limitations in their use, especially that they are susceptible to biodegradation and increase on thickness, bulkiness and weight upon wetting. Provide four (4) reasons as to why these limitations are a positive attribute as far as the conservation of a given fishery is concerned (***8 marks***).

iv. Why are synthetic fibers most preferred as netting material for fishing gear compared to natural fibers? (***2 marks***).

SECTION B - Optional

There are six (6) questions in this section. You are required to choose and attempt any **four (4)** questions. Failure to adhere to this instruction may result in loss of marks.

QUESTION TWO (20marks)

"Military prowess and industrialization have largely contributed to the rapid depletion of fish stocks in most aquatic ecosystems of the world." Argue for or against this school of thought, providing technical justification for your arguments. (**20 marks**)

QUESTION THREE (20marks)

a. Briefly discuss two (2) senses that are played upon when constructing and using traps for catching fish in a small lentic ecosystem (**10marks**).

b. In your opinion, why are traps and weir detrimental to the ecological integrity of a multispecies fishery? (**5marks**).

c. Discuss any two factors that are most likely to influence gear selectivity of traps (**5marks**).

QUESTION FOUR (20marks)

a. What is the difference between a fishing gear and a fishing method? (**2marks**).

b. Briefly discuss limitations associated with the use of gillnets in collecting biological data on fish or fisheries (**8marks**).

Describe as to why the foraging ecology and vertical adaptation of a targeted fish species are important parameters to consider when constructing a fishing gear. (**10marks**).

QUESTION FIVE (20marks)

a. On a technical scale, differentiate fish aggregating devices from fish detection devices (**4marks**)

b. Briefly explain how the technology of echosounder work in hydroacoustic studies of bathypelagic fish populations (**6marks**).

c. The Nature Conservancy (TNC) are working on Lake Itezhi Tezhi to improved stock performance of *Limnothrissa miodon* (Kapenta), a small pelagics introduced in that lake. As a fisheries expert, advise TNC on how best they can use hydroacoustic methods (such as echosounder) to effectively design conservation and management measures? (**8marks**).

d. What is sock time and why is it an important parameter in determining efficiency of a gear? (**2marks**).

QUESTION SIX (20marks)

a. Some conservationists have argued that use of fish aggregating devices (FADs) may be detrimental to the stability of fish stocks on spatiotemporal scale. With two examples, briefly discuss why you may concur with this school of thought (**8marks**).

b. Briefly discuss two ways in which fish aggregating devices (FADs) can be used to improve stock performance of inshore fisheries in a multispecies system such as the Lake Mweru Wa Ntipa (**8marks**).

c. Why is site survey an important initial step in the setting of fish aggregating devices (FADs) or artificial reefs? (**4marks**).

QUESTION SEVEN (20marks)

a. Distinguish gear selectivity from gear efficiency (**2marks**).

b. Technically explain four ways how a beach seine affects the reproduction and population structure of fish in an area its frequently operated in (**8marks**).

c. As a scientist, why would you insistently prefer to use the beach seine net to collect fisheries biological data even when then gear is banned for use in commercial fisheries of Zambia (**5marks**)?

d. Briefly discuss three ecological impacts associated with the use of dredges in commercial fisheries. (**5marks**).

END OF EXAMINATION, BEST WISHES.

KAPASA MAKASA UNIVERSITY

FACULTY OF APPLIED SCIENCE AND OPEN LEARNING

DEPARTMENT OF AGRICULTURE AND AQUATIC SCIENCES

CHINSALI, MUCHINGA PROVINCE

AQUACULTURE SYSTEMS AND ENGINEERING - FA 310

END OF YEAR FINAL SESSIONAL EXAMINATION

21ST OCTOBER 2024

INSTRUCTIONS TO CANDIDATES

1. Time allowed is **THREE (3) HOURS**
2. Remember to write your student identity number (SIN) on the provided answer sheets
3. All questions carry equal marks **(20 Marks)**
4. Question one is **COMPULSORY**
5. Attempt a total of **FIVE** questions

CELLPHONES AND OTHER RELATED GAGETS ARE NOT ALLOWED IN THE EXAMINATION ROOM

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QUESTION 1

1.

A. State and write short notes on the three parameters required to describe the re-use or recirculation system. **[6 Marks]**

B. What are the advantages and disadvantages of:

i. Open channel **[2 Marks]**

ii. Re-use system **[3 Marks]**

C. Sketch and label a centralized water re-use system **[9 Marks]**

QUESTION 2

2. With the help of a well-labeled diagram, discuss all the possible technical components of a land–based fish hatchery and juvenile production farm. **[8 Marks]**

A. State and briefly describe four advantages of the water recirculation system. **[8 Marks]**

B. State and briefly describe two disadvantages of the water recirculation system. **[4 Marks]**

QUESTION 3

3. You are managing a freshwater aquaculture pond system, and during routine water quality monitoring, you find that the pH levels have dropped to 5.8, well below the optimal range for the species you're cultivating.

A. What could be the possible causes of the low pH in your pond, and how might this affect the health of the fish? **[10 Marks]**

B. Describe the actions in detail you would take to adjust the pH back to the optimal range and prevent it from dropping again. **[10 Marks]**

QUESTION 4

4. Kafue Fisheries fish farm has just constructed one pond, measuring 12.5m x 30m, and as employed you as a Graduate trainee to estimate the profits in 1 year project period. Refer to the following assumptions below; **[20 Marks]**

- 60% running costs from the gross revenue realized.
- Using sexually reversed fingerlings.

- 10% mortalities.
- Stocking density of 6 fingerlings/m^2.
- 2 production cycles per year (each cycle is 6 months).
- A growth rate of 300g at the end of each cycle.
- Kafue fisheries fish price of K89/kg.

QUESTION 5

5. Write short notes on the following.

A. Hatchery. **[4 Marks]**

B. Semi-intensive farming system. **[4 Marks]**

C. Mooring system. **[4 Marks]**

D. Pond culture system. **[4 Marks]**

E. Raceway culture system. **[4 Marks]**

QUESTION 6

6. A government initiative plans to expand aquaculture operations in rural areas to improve food security and create jobs. However, the initiative lacks detailed guidelines on site selection for aquaculture projects.

A. As an aquaculture expert, you are tasked with advising the government on developing comprehensive guidelines for selecting suitable sites for aquaculture. **[15 Marks]**

B. Discuss how the improper consideration of these factors could negatively impact the sustainability and productivity of the aquaculture project. **[5 Marks]**

QUESTION SEVEN

7. A fish farming company in Zambia is considering starting a cage farming project in a large freshwater lake. The company has identified two potential locations:

Location A: Near the lake's shoreline, with shallow water and moderate currents. The area is close to a fishing village, providing easy access to labor and markets.

However, the water quality fluctuates due to runoff from nearby agricultural activities, and there is a risk of theft due to the proximity to the village.

Location B: Farther from the shore, in deeper water with strong currents and good water quality. It is located far from human settlements, making labor and transportation more expensive. However, the risk of pollution and theft is low.

TASK:

Evaluate both locations in terms of their suitability for cage farming. Recommend which location the company should choose for their cage farming project, and justify your recommendation.

(20 marks)

END OF EXAMINATION, BEST WISHES.