



UNIVERSITY OF eSWATINI
1st SEM. 2019/2020
FINAL EXAMINATION PAPER

PROGRAMME: B.Sc. AGRICULTURAL EDUCATION YEAR 4
B.Sc. AGRICULTURAL EXTENSION YEAR 4
B.Sc. ANIMAL SCIENCE YEAR 4
B.Sc. AGRICULTURAL & BIOSYSTEMS ENGINEERING
YEAR 4

COURSE CODE: ASC403

TITLE OF PAPER: FISH FARMING

TIME ALLOWED: TWO (2) HOURS

INSTRUCTIONS: ANSWER ANY FOUR (4) QUESTIONS

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THE CHIEF INVIGILATOR**

QUESTION 1

a) Draw and label a diagram of the internal anatomy of *Oreochromis niloticus*.

(15 Marks)

b) Describe the meristic characteristics of the terms listed below:

i) Dorsal fin

(5 Marks)

ii) Pharyngeal teeth

(5 Marks)**QUESTION 2**

a) Write an essay under the heading, "Fish Stress".

(20 Marks)

b) State two examples of how fish farms can be managed to minimise the environmental impact?

(5 Marks)**QUESTION 3**

a) You want to grow species in cages off Maguga Dam. During a preliminary assessment of the dam, you discover that the water is of high quality, low nutrient, full-strength freshwater. The water has an alkalinity and hardness of 30ppm, pH level of 8.5, and nitrate and nitrite levels of 0mg/l respectively. You want to use a native species for culture. Select a species (common name and its scientific name) that will grow well under these water quality conditions.

(3 Marks)

b) Based on your answer above, what type of culture system and management practices do you recommend for grow out from fingerlings to market size?

Your answer should include information on the following subheadings:

i) Culture system

(2 Marks)

ii) Fish density and flow rates

(6 Marks)

iii) Feeds

(4 Marks)

iv) Limitations of the system

(4 Marks)

v) Explain the mechanisms the system uses to overcome organic loading and biological oxygen demand.

(6 Marks)

QUESTION 4

Outline the steps involved in the artificial propagation of *clarias gariepinus* in a greenhouse.

(25 Marks)**QUESTION 5**

a) Based on Table 1 below,

Table 1. The stocking density and performance measures of tilapia cultured for 200 days.

Performance Measures	Stocking density/ha					
	18 000	20 000	30 000	60 000	80 000	100 000
Stocking weight, g	380	279	206	260	150	243
Harvest weight, g	580	399	390	420	354	318
Growth, g/day	2.45	2.60	2.60	2.3	2.0	1.48
Production rate, kg/ha/d	50	46	76	143	163	146
Calculated standing crop at 200 days, kg/ha	10 100	9 200	15 100	28 800	32 600	29 300
Feed conversion	2.7	1.5	3.0	2.9	3.1	3.2

(i) When was the critical standing crop reached and on what information did you use to draw that conclusion?

(5 Marks)

(ii) Explain why the production rate drops at 100 000/ha stocking density.

(5 Marks)

(b) As a manager of a tilapia farm, your assistant gave the information below as part of a report from the aquaria section of the farm.

Fingerlings average initial weight: 2.8 g,

Stocking date: 1 March 2019,

Harvest date: 31 May 2019

Tank dimensions: 510 mm x 225 mm

15% of the fingerlings in one tank were sampled and the results are presented in Table 2 below.

Table 2. The weight (g) of fingerlings sampled from an aquarium at harvest.

Fish	Weight (g)
1.	15.1
2.	8.3
3.	9.1
4.	12.5
5.	11.5
6.	7.5
7.	10.5
8.	11.5
9.	12.2
10.	10.4

Calculate the standing crop and the absolute growth rate at harvest.

(15 Marks)