

UNIVERSITY OF RUHUNA
BACHELOR OF SCIENCE IN FISHERIES AND MARINE SCIENCES DEGREE

Level II Semester II Examination

Dec/Jan 2015/2016

FAQ 2223 Fish Population Dynamics

Time: 02 hours

Answer **Four (04)** questions selecting at least **one (01)** from each of the Parts

Part I

- 01) Describe the stock assessment methodologies applicable to tropical environment. (50 marks)
- 02) Write short accounts on **any three** of the following (50 marks)
- (a) Unit stock
 - (b) Anabolism and catabolism
 - (c) Lee's phenomenon
 - (d) Isometric growth and allometric growth
 - (e) Holistic models and analytical models
- 03) "Analysis of length-frequency data is suitable for estimating growth parameters of a tropical fish species". Justify. (50 marks)
- 04) Write a brief essay on
- (a) Recruitment of fish (25 marks)
 - (b) Gear selection ogive (25 marks)
- 05) (a) Summarize the major steps in estimating gillnet selectivity. (25 marks)
- (b) Discuss the advantages and disadvantages of hard part analysis for growth determination. (25 marks)

Part II

- 06) (a) What is meant by semi-quantitative methods in fish stock assessment? (12.5 marks)
- (b) What are the situations where semi quantitative methods are useful for assessing fish stocks? (12.5 marks)
- (c) Briefly describe the importance of “morpho-edaphic index” for the management of inland fisheries. (25 marks)

- 07) From a purse seine fishery for *Elagatis bipinnulata*, the following information was collected in six years.

| Year | Mean length (cm) | Fishing effort (x 100 boat-days per year) |
|------|------------------|---|
| 1994 | 50 | 300 |
| 1996 | 48.3 | 350 |
| 1998 | 46 | 435 |
| 2000 | 45.8 | 460 |
| 2002 | 44.9 | 475 |
| 2005 | 44.3 | 500 |

The growth of *Elagatis bipinnulata* stock is described by the following equation.

$$L_t = 97.5 (1 - \exp(-0.6(t-t_0)))$$

where L_∞ is the asymptotic fork length in cm; and Growth constant (K) is on annual basis.

Smallest length of fish under full exploitation (L') = 30 cm

- (i) Estimate Total mortality (Z) of fish stock in years 1994, 1996, 1998, 2000, 2002 and 2005. (20 marks)
- (ii) Estimate natural mortality of fish stock. (15 marks)
- (iii) Assuming natural mortality remained constant over the period of investigation, examine trends in the level of exploitation over the period 1996-2003. Give reasons for your judgment. (08 marks)
- (iv) State the assumptions behind this analysis and their validity. (07 marks)