



UNIVERSITY OF RUHUNA  
FACULTY OF FISHERIES AND MARINE SCIENCES & TECHNOLOGY

Academic Year 2022/2023

Bachelor of Science Honours in Fisheries and Marine Sciences Degree

Level III Semester II Examinations – October/November 2024

FAQ 3222: Advanced Molecular Genetics Applicable for Fisheries and Aquaculture

Time: 1 hour & 30 minutes

Answer any three (03) questions

01. (a) State whether the following statements are “True” or “False” and justify your answer.

- (i) The phenotype of an individual is determined entirely by its genotype.
- (ii) The structural difference between DNA and RNA lies solely in the type of sugar they contain.
- (iii) A nucleotide is formed by adding a phosphate group to a nucleoside.
- (iv) The pyrimidines are derived from the double-ringed structure.
- (v) B-DNA is the most common form of DNA in cells.

(20 marks)

(b) Briefly explain the structure of a gene with suitable illustrations.

(30 marks)

(c) “Different types of RNA play an important role in the process of cellular protein synthesis”. Discuss this statement.

(50 marks)

02. (a) “Various types of bonds play a crucial role in stabilizing the double-helix structure of DNA”. Discuss this statement.

(30 marks)

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- (b) Briefly explain the different types of DNA sequences found in the genome, focusing on unique and variable sequences. (30 marks)
- (c) Briefly describe how conventional genetic manipulation techniques can be used to select desirable phenotypes in farmed fish stocks. (40 marks)

03. (a) Polymerase Chain Reaction (PCR) is widely used to make millions to billions of copies of a specific DNA sample. Summarize the process of Polymerase Chain Reaction using appropriate diagrams. (40 marks)
- (b) Compare the different approaches of PCR based molecular markers used in the field of molecular biology. (60 marks)

04. (a) Describe the different types of technologies used in the first-generation sequencing. (50 marks)
- (b) "Next Generation Sequencing (NGS) is considered superior to first generation sequencing technology in modern genomic research". Justify the given statement. (50 marks)

05. Write short notes on **any four (04)** of the following.

- (a) DNA denaturation and renaturation
- (b) Desirable properties of molecular markers over morphological markers
- (c) DNA hybridization based molecular marker
- (d) Different types of vectors used in DNA cloning
- (e) Recombinant selection methods used in DNA cloning

(100 marks)

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