



UNIVERSITY OF RUHUNA

FACULTY OF FISHERIES AND MARINE SCIENCES & TECHNOLOGY

Academic Year 2023/2024

Bachelor of Science Honours in Fisheries and Marine Sciences Degree

Level III Semester II Examinations – April/May 2025

FAQ 3222: Advanced Molecular Genetics Applicable for Fisheries & 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 nucleoside is the fundamental building block of DNA/ RNA.
- (ii) Deoxyribose sugar lacks a hydroxyl group at 2' position.
- (iii) Cytosine is a double-ringed structure.
- (iv) The less ordered the bases are, the more UV light is absorbed
- (v) During gel electrophoresis, the wells in the agarose gel should be positioned near the negative electrode.

(20 marks)

(b) Explain various types of bonds that are crucial for stabilizing the double helix structure of the DNA molecule and support your explanation with appropriate illustrations.

(30 marks)

(c) Describe the cellular processes through which a genotype is expressed as the phenotype of an organism.

(50 marks)

02. Describe the chemical and physical properties of nucleic acids and explain how these properties are utilized in molecular biology techniques.

(100 marks)



03. (a) "Molecular markers provide a more reliable, efficient, and precise way to study genetic variation compared to morphological markers." Justify the given statement.

(40 marks)

(b) Compare different approaches of sequence based molecular markers used in the field of genome science.

(60 marks)

04. (a) DNA cloning is a revolutionized science, leading to breakthroughs in medicine, agriculture, and biotechnology. Describe the process of DNA cloning.

(50 marks)

(b) "In DNA cloning, various types of vectors are utilized, each tailored to specific cloning needs based on different aspects." Justify the given statement providing suitable examples.

(50 marks)

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

(a) Structure of a gene

(b) Applications of conventional genetic manipulation techniques in aquaculture

(c) DNA hybridization based molecular marker

(d) Polymerase Chain Reaction (PCR)

(e) Use of microsatellites as a molecular marker

(100 marks)

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