

THE OPEN UNIVERSITY OF SRI LANKA

FACULTY OF NATURAL SCIENCES

DEPARTMENT OF ZOOLOGY

BSc DEGREE PROGRAMME – 2025/26

LEVEL 05

FUNDAMENTALS OF MOLECULAR BIOLOGY – ZYU5315

FINAL EXAMINATION

DURATION – 02 HOURS



REGISTRATION NUMBER:

DATE: 3rd December 2025

TIME: 9.30 am – 11.30 pm

ANSWER **FOUR (04)** QUESTIONS ONLY

1. a) Describe the process of DNA replication in Eukaryotic organisms. (50 marks)
 b) How do cells solve the end replication problem? (20 marks)
 c) Describe the importance of DNA replication in maintaining cellular function and inheritance. (30 marks)
(Total 100 marks)
2. a) Explain the mechanism of Polymerase Chain Reaction (PCR). (60 marks)
 b) Describe its applications in different fields. (30 marks)
 c) What are the optimization steps that can be used when expected band has not appeared in the agarose gel. (10 marks)
(Total 100 marks)
3. Discuss DNA fingerprinting and explain how Southern blotting contributes to this technique. (Total 100 marks)
4. Describe the primary, secondary, tertiary, and quaternary structures of proteins. (Total 100 marks)
5. Write short notes on the following
 - i) Secondary Structural patterns in RNA
 - ii) Factors that influence the melting temperature (T_m) of DNA
 - iii) Differences between eukaryotic and prokaryotic genomes
 - iv) Secondary structure of DNA**(Total 100 marks)**

6. This question is based on following coding strand from human genome

5'-AGCAATGCATTCATCGTAATGG-3'

- Using above coding strand, illustrate sense strand and the antisense strand
- What is an open reading frame (ORF)? What are the three main components of an ORF?
- What is the transcribed product of this sequence?
- Writing three possible reading frames and the corresponding amino acid sequence using genetic codes provided by figure 1.
- Which is the best ORF and give reasons for your answer
- What would the effect on translation if nucleotides are changed as follows?
 - Changing the 1st A to a C; ii) Changing 4th C to a G; iii) Changing 3rd C to a A
 (Take best ORF to answer this part of the question)

(Total 100 marks)

		Second letter					
		U	C	A	G		
First letter	U	UUU } Phe UUC } UUA } Leu UUG }	UCU } UCC } Ser UCA } UCG }	UAU } Tyr UAC } UAA Stop UAG Stop	UGU } Cys UGC } UGA Stop UGG Trp	U C A G	Third letter
	C	CUU } CUC } Leu CUA } CUG }	CCU } CCC } Pro CCA } CCG }	CAU } His CAC } CAA } Gln CAG }	CGU } CGC } Arg CGA } CGG }	U C A G	
	A	AUU } AUC } Ile AUA } AUG Met	ACU } ACC } Thr ACA } ACG }	AAU } Asn AAC } AAA } Lys AAG }	AGU } Ser AGC } AGA } Arg AGG }	U C A G	
	G	GUU } GUC } Val GUA } GUG }	GCU } GCC } Ala GCA } GCG }	GAU } Asp GAC } GAA } Glu GAG }	GGU } GGC } Gly GGA } GGG }	U C A G	

Figure 1. Genetic code