

UNIVERSITY OF RUHUNA  
BACHELOR OF SCIENCE (GENERAL) DEGREE LEVEL II (SEMESTER I)  
EXAMINATION - AUGUST 2017  
SUBJECT: BOTANY

COURSE UNIT: BOT2131 (MOLECULAR BIOLOGY)

**Time: One (01) hour**

Answer **two (02)** questions, including **the first** question.

I.

a) Write the base sequence of the following DNA strand. (10 marks)



b) Write the complementary base sequence of the above DNA strand. (10 marks)

c) What is the base sequence of the mRNA molecule produced from the above DNA strand?

(10marks)

d) In a double stranded DNA molecule, what is the relationship of A, T and G, C and between [A] + [G] and [C] + [T]? (10 marks)

e) Draw a line diagram to show the different secondary structures of an RNA molecule.

**(12 marks)**

f) Fill in the table using suitable answers in order to compare the structure/function or organization of eukaryotic and prokaryotic chromosomes.

**(10 marks)**

	Prokaryotic Chromosomes	Eukaryotic Chromosomes
1. Where is it found?		
2. Introns/exons		
3. Histone proteins		
4. Gene organization		
5. Gene Regulation		

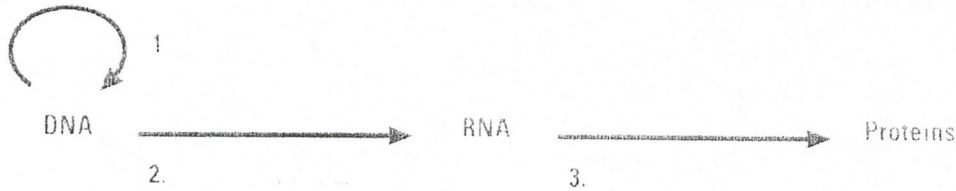
g) How does a DNA molecule denature?

(14 marks)

h) Using only a fully labeled diagram, explain the characteristic features of the B-DNA molecule. (24 marks)

2.

a) Label each of the processes represented by the arrows in the diagram below. **(6 marks)**



b) Fill in the table in order to compare the transcription and translation of DNA. **(44 marks)**

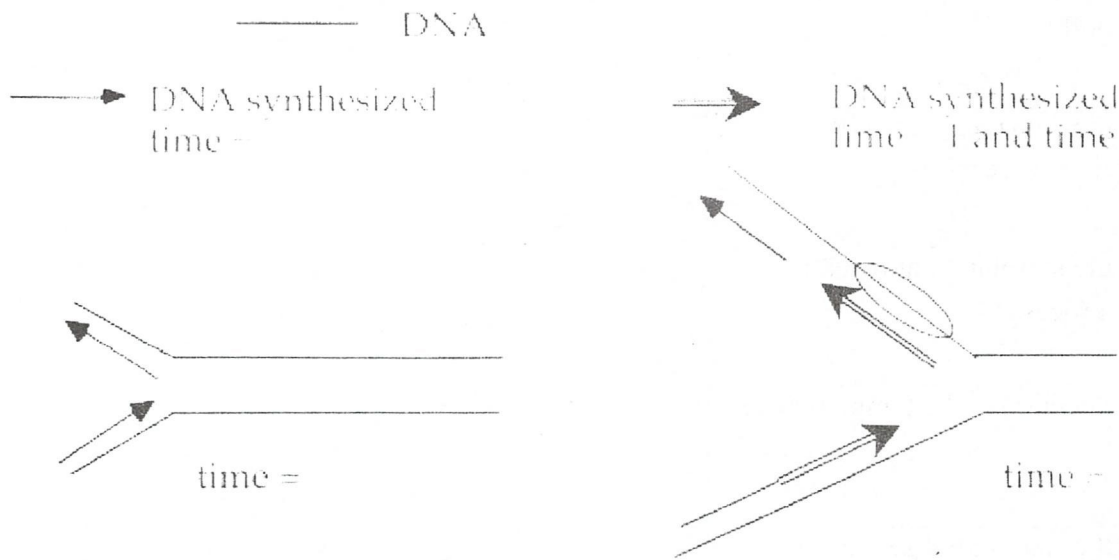
	Transcription	Translation
1. Where does this process occur in a prokaryotic cell?		
2. Where does this process occur in a eukaryotic cell?		
3. What is the enzyme/ protein that carries out this process?		
4. What is the template that is read during this process?		
5. In what direction is the template read?		
6. What is the start signal/sequence for this process?		
7. What is the polymer that is formed?		
8. What monomer is used to form this polymer?		

9. What type of bond is formed between monomers?		
10. In what direction is the new polymer formed?		
11. What is the stop signal/sequence for this process?		

c) Shown below are two sequential close-up views of the same replication fork.

Label the 5' and 3' ends, the leading and the lagging strands of the DNA molecules shown.

**(20 marks)**



Arrows indicate the direction of DNA

d) DNA replication involves many different enzymatic activities. Mention the role of five enzymes/ proteins in DNA replication.

**(20 marks)**

Enzyme / protein	Role
1	
2	
3	
4	
5	

e) Giving examples, mention two occasions where radioactive elements are used in Molecular Biology. (10 marks)

3)

a) Briefly explain how the purity of a DNA sample is determined. (40 marks)

b) Using a suitable diagram **only**, explain the experiment of Avery *et al.* that proved 'DNA is the hereditary molecule'. (60 marks)