UNIVERSITY OF RUHUNA

BACHELOR OF SCIENCE (GENERAL DEGREE) LEVEL II (SEMESTER I)

EXAMINATION –January, 2022

SUBJECT: BOTANY

Time: 1 hour

Course unit: Molecular Biology (BOT2131)

Answer **two (02)** questions including the question **No 1**

Use the spaces given in the paper to answer questions

Question No.	Marks
Q_1	
Q_2	
Q_3	
Total	
%	

1.

Part A

Underline the correct answer **(20 marks)**

i. The _____ codon starts the message and also codes for methionine.

(a) AAC (b) AUG (c) CUA (d) GUC

ii. Mode of DNA replication is

a. Conservative and bidirectional
b. Semiconservative and unidirectional
c. Semiconservative and bidirectional
d. Conservative and unidirectional

iii. Which enzyme is used in the unwinding of DNA for replication?

a. Ligase
b. Topoisomerase
c. Helicase
d. Exonuclease

iv. The major form of DNA in cells is

a. A-DNA
b. B-DNA
c. Z-DNA
d. C-DNA

v. Which of the following processes does not occur in prokaryotes?

a. Transcription
b. Splicing
c. Translation
d. Replication

vi. The information carried by a DNA molecule is in

a. its amino acid sequence.

b. the sugars and phosphates forming its backbone.

c. the order of the nucleotides in the molecule.

d. the total number of nucleotides it contains.

vii. Which of the following is **not** a characteristic of a tRNA molecule?
a) Beta arm (b) D arm (c) T arm (d) Anticodon arm

viii. Which of the subunits of RNA polymerase holoenzyme is responsible for promoter reccgnition?

(a) The beta subunit b) The sigma subunit

(c) The gamma subunit. (d) The delta subunit

ix. Fredrick Griffith's experiment involving *Streptococcus pneumoniae* led to the discovery of

a) DNA as genetic material
b) RNA as genetic material
c) Protein as genetic material
d) Transforming principle

x. Which of the following is not a characteristic of prokaryotic terminators?

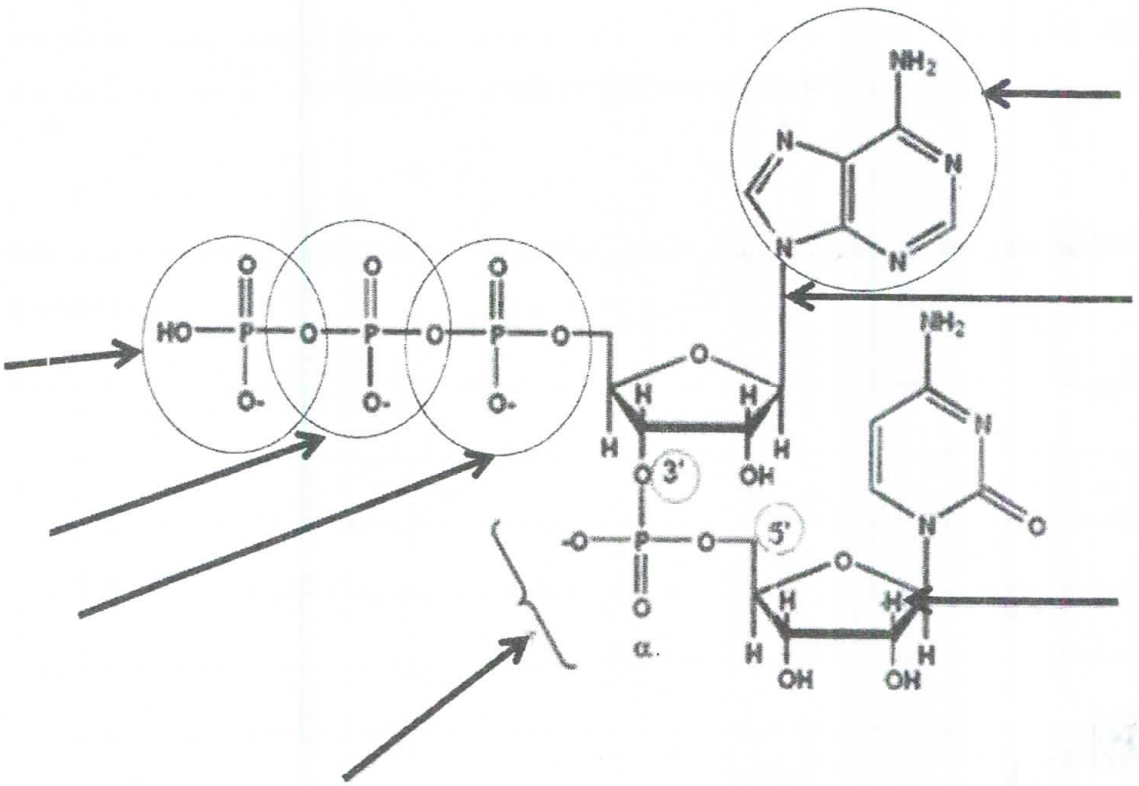
(a) Rho-independent terminators (b) Rho-dependent terminators

(c) The TATA box (d) Hairpin loops

Part B

1.

i. Label each part of the following diagram shown in arrows. **(14 marks)**



ii. Filling the following blanks in the paragraph with suitable /appropriate words given **penetration, attachment, cell lysis, infection, nucleic acid, bacterium, building blocks, new bacteriophages, bacterial cytoplasm, nucleic acid, many new λ -phage viruses, virus particles, tail fibers, many protein molecules, lytic cycle, molecules).** **(30 marks)**

The first stage of λ -phage infection is ..... to the cell wall of a bacterium. The phage does this using its ..... The tail of the phage then contracts downward. The tail releases an enzyme which penetrates the wall and ..... is injected into the ..... This stage of infection is called ..... The capsid of the virus is left outside the cell. Now the synthesis stage begins. Using ..... found in the bacterial cytoplasm, numerous copies of the ..... and ..... are produced. In the

next stage of the cycle (the assembly stage), these ..... will be used to form ..... The cycle ends with the release of the new ..... is this rupture that gives the ....., its name. If a growth curve is plotted, an initial latent period is seen. This corresponds to the stage of ..... which takes place inside the ..... A rapid increase follows due to the release of .....

iii What were the structural features of the DNA molecule described by Watson and Crick?

(22 marks)

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iv. Draw a line diagram to show the structure of a prokaryotic ribosome. **(14 marks)**

2.

i. With **a fully labeled diagram only**, explain the Avery *et al* experiment. **(50 marks)**

ii. Write the nucleotide (base) sequence of the following DNA segment. **(10 marks)**

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iii. Write the complementary base sequence of the above DNA segment. **(10 marks)**

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iv. What is the corresponding mRNA molecule sequence by this DNA segment?

(10 mark

.....

v. What are the conserved promoter sequences of *E. coli* and write the sequences of them

(20 marks)

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3.

i. Name five scientists who involved in proving that DNA is the genetic material of organisms and mention the role played. **(10 marks)**

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ii. Giving examples for radioactive elements used in molecular biology, list the occasions of their uses in molecular biology. **(20 marks)**

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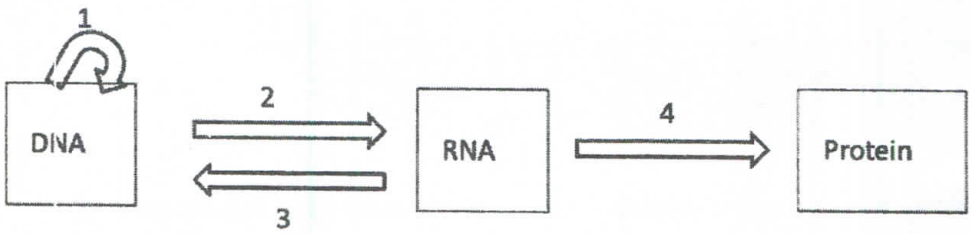
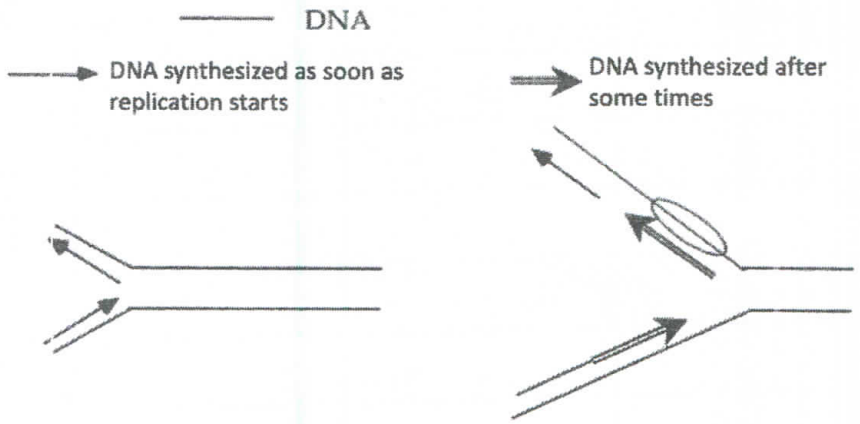
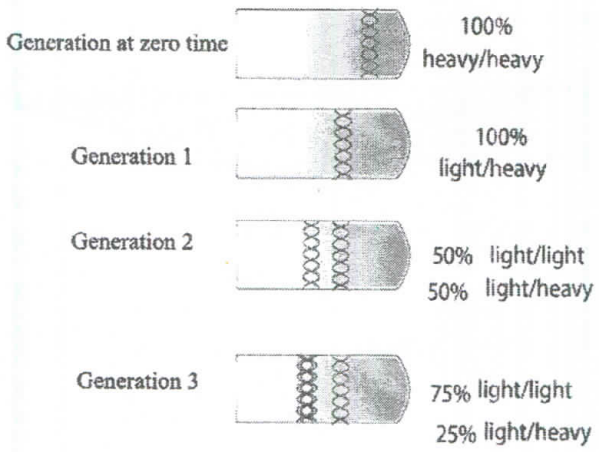
iii. Name each of the processes represented by the arrows as numbered in the diagram below. **(10 marks)**



iv. Below figure shows the two sequential close-up views of the replication fork of DNA as soon as replication starts and at the DNA synthesized after some times. **Mentioning the reason,** label the 5' and 3' ends, the leading and the lagging strands of the DNA molecules shown. (Arrows indicate the direction of DNA synthesis.) **(25 marks)**



v. Following figure shows the results of the Meselson and Stahl experiment after CsCl density gradient centrifugation of bacterial DNA at different time periods (zero generation, generation 1, generation 2, generation 3). Briefly explain the experimental results. **(25 marks)**



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