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QUALIFICATION : **BACHELOR of MEDICAL LABORATORY SCIENCES**	
QUALIFICATION CODE: **08BMLS**	LEVEL: **5**
COURSE: **CELL AND MOLECULAR BIOLOGY**	COURSE CODE: **CMB521S**
DATE: **JANUARY 2025**	SESSION: **1**
DURATION: **3 HOURS**	MARKS: **100**

SECOND OPPORTUNITY: QUESTION PAPER

EXAMINER: Ms Belinda Roselin Tsauses

MODERATOR: Ms Vanessa Tjijenda

INSTRUCTIONS:

1. Answer all questions in the answer book.
2. Please write neatly and legibly.
3. Do not use the left side margin of the exam paper. This must be allowed for the examiner.
4. No books, notes and other additional aids are allowed.
5. Mark all answers clearly with their respective question numbers.

PERMISSIBLE MATERIALS:

1. None.

ATTACHEMENTS

1. None.

This question paper consists of 7 pages including this front page.

SECTION A: MULTIPLE CHOICE AND TRUE / FALSE [20 MARKS]

QUESTION 1: MULTIPLE CHOICE QUESTIONS [10 MARKS]

Evaluate the statements in each numbered section and select the most appropriate answer or phrase from the given possibilities. Fill in the appropriate letter next to the number of the correct statement/phrase in your ANSWER BOOK. [10]

1.1 The site for transcription is the: (1)

a) Nucleus.

b) Cytoplasm.

c) Ribosomes.

d) Mitochondria.

1.2 The site for translation is the: (1)

a) Nucleus.

b) Cytoplasm.

c) Ribosomes.

d) Mitochondria.

1.3 The site for the assembly of the growing polypeptide chain in protein synthesis is: (1)

a) rRNA.

b) tRNA.

c) mRNA.

d) None of the above.

1.4 During the processing steps of mRNA, _____ involves removal of introns from newly synthesized mRNA strands. (1)

a) Polyadenilation.
b) Termination.
c) Slicing.
d) Capping.

1.5 The enzyme responsible for unwinding and separating double stranded DNA as it moves along the DNA is called: (1)

a) DNA ligase.
b) DNA gyrase.
c) DNA polymerase.
d) DNA helicase.

1.6 _____ are arranged in two long strands that form a spiral called a double helix. (1)

a) Genes.
b) Ribosomes.
c) Histones.
d) Nucleotides.

1.7 In DNA, together, a base, sugar, and phosphate are called _____. (1)

a) Nucleosides.
b) Base pairs.
c) Nucleotide.
d) Histones.

1.8 Besides the nucleus, a small amount of DNA can also be found in the _____. (1)

a) Mitochondria.
b) Ribosomes.
c) Golgi complex.
d) Lysosomes.

1.9 _____ "proofreads" the newly formed DNA to check, remove and replace any errors. (1)

a) Exonuclease.
b) DNA gyrase.
c) DNA primase.
d) None of the above.

1.10 Topoisomerase or _____ unwinds and rewinds DNA strands to prevent the DNA from becoming tangled or supercoiled. (1)

a) DNA ligase.
b) DNA polymerase.
c) DNA helicase.
d) DNA gyrase.

QUESTION 2: TRUE/FALSE QUESTIONS **[10 MARKS]**

Evaluate the statements and select whether the statement is true or false. Write the word 'True' or 'False' next to the corresponding number in your ANSWER BOOK. Correct the incorrect word(s) in each false statement. [10]

2.1 Transfer RNAs, or tRNAs, are molecular "bridges" that connect mRNA codons to the amino acids they encode.

2.2 Ribosomes are made up of carbohydrates and RNA (ribosomal RNA, or rRNA).

2.3 There are 3x4x4=48 possible combinations in the genetic code.

2.4 Transcription is the second step in gene expression.

2.5 DNA sequence that indicates where a genetic sequence can be read and decoded (promoter region) is known as the TATA box.

2.6 DNA polymerase is the main enzyme involved in transcription.

SECTION B: SHORT ANSWER QUESTIONS [48 MARKS]

Please answer ALL of the questions in this section.

QUESTION 3: **[18 MARKS]**

3.1 Briefly explain the process of signal transduction in cell communication. (5)

3.2 With an aid of a diagram, explain the concept of ligand and receptor binding in cell communication. **(Three (3) marks for the diagram and five (5) marks for the explanation.)** (8)

3.3 Name five (5) important aspects related to cell-cell adhesion that are significant to cell biology. (5)

QUESTION 4: **[30 MARKS]**

4.1 What is the biological significance of the function of membrane carbohydrates found in the cell membrane? (6)

4.2 Demonstrate your understanding of how vesicular transport takes place in your own words. (12)

4.3 Explain how normal cell growth occurs in the human body, using the skin as an example. (12)

SECTION C: LONG ANSWER QUESTIONS [32 MARKS]

Please answer ALL of the questions in this section. Give your answers in point form.

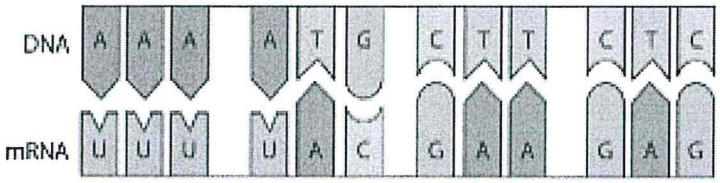
QUESTION 5: **[14 MARKS]**

Detail the 2nd and 3rd steps involved in DNA replication. Give your answer(s) in point form. **(One (1) mark for naming the correct step and nine (6) marks for detailing each step.)**

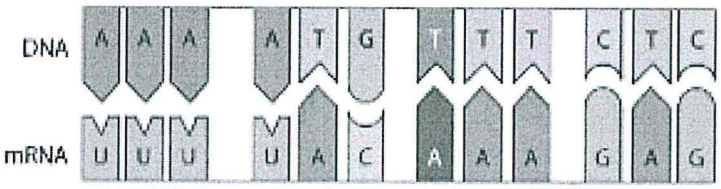
QUESTION 6: **[18 MARKS]**

Study the normal strand below and compare with mutations indicated from 6.1.1 – 6.1.3. For each diagram, identify the type of mutation, explain where the mutation occurred and interpret which amino acids have been coded for on the entire strand using the attached genetic code table. **(One (1) mark for identifying mutation type, one (1) mark for the explanation and four (4) marks for interpreting (may give abbreviations) the coded amino acids on each strand.)** (18)

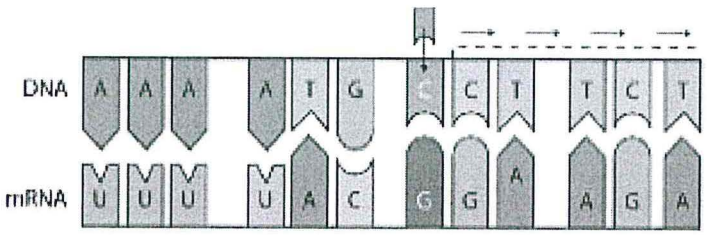
Normal:



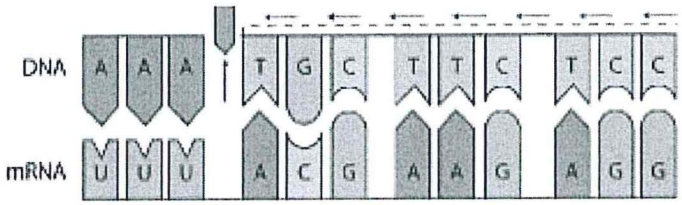
6.1.1



6. 1.2



6.1.3



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

END OF QUESTION PAPER.