



PAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Faculty of Health and Applied Sciences

Department of Health Sciences

QUALIFICATION: BACHELOR OF MEDICAL LABORATORY SCIENCES	
QUALIFICATION CODE: 08BMLS	LEVEL: 6
COURSE: CELL AND MOLECULAR BIOLOGY	COURSE CODE: CMB521S
DATE: JANUARY 2019	SESSION:
DURATION: 3 HOURS	MARKS: 100

SUPPLEMENTARY/SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	Ms V Tjjenda
MODERATOR:	Dr M Mukesi

INSTRUCTIONS
<ol style="list-style-type: none"> 1. Answer all questions. 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. 6. Genetic code included

Permissible material

Non programmable calculator is allowed.

THIS QUESTION PAPER CONSISTS OF 4 PAGES (Excluding this front page)

SECTION A (28 MARKS)**QUESTION 1****[10]**

Evaluate the statements in each numbered section and select the most appropriate answer or phrase from the given possibilities. Write the appropriate letter next to the number of the statement/phrase.

1.1 Which of the following is not true of Prokaryotes?

(1)

- a. Transcription and translation take place in the cytoplasm
- b. The coding region of a gene cannot be interrupted
- c. More than one gene can be co-transcribed
- d. Translation occurs at the same time as transcription

1.2 Nucleic acid molecules are orientated 5' to 3' by convention. What is attached to the 5' and 3' carbons located at each end of a DNA molecule?

- a. 5' base and 3' phosphate
- b. 5' base and 3' hydroxyl
- c. 5' hydroxyl and 3' base
- d. 5' phosphate and 3' hydroxyl

1.3 Identify the molecule that serves to destabilize the DNA helix in order to open it up, creating a replication fork?

- a. DNA helicase
- b. DNA ligase
- c. DNA polymerase
- d. SSBPs
- e. DNA Gyrase

1.4 Okazaki fragments are joined together by:

(1)

- a. RNA polymerase
- b. DNA ligase
- c. DNA polymerase
- d. RNA ligase

1.5 Deduce the mutation that changes C to T in the coding sequence below: (1)

ACG-GGC-CAA-TTA-ACG changed to ACG-GGC-TAA-TTA-ACG

- a. Frame-shift mutation
- b. Missense mutation
- c. Nonsense mutation
- d. Silent mutation

1.6 Polyacrylamide gels are used to _____: (1)

- a. Separate DNA fragments
- b. Separate RNA fragments
- c. Separate proteins
- d. Separate DNA from RNA

1.7 A nucleoside molecule lacks a: (1)

- a. Phosphate group
- b. Hydroxyl group
- c. Nitrogenous base
- d. Pentose sugar

1.8 Which of the following does not regulate apoptosis? (1)

- a. BCL-2
- b. Caspases
- c. Cytochrome c
- d. Endocrine signalling

1.9 Which enzyme replaces primers during DNA replication in prokaryotes? (1)

- a. Ligase
- b. Primase
- c. DNA Polymerase I
- d. Nuclease

1.10 Identify the organelle is responsible for storing proteins. (1)

- a. Golgi apparatus
- b. Vesicles
- c. Endoplasmic reticulum
- d. Lysosomes

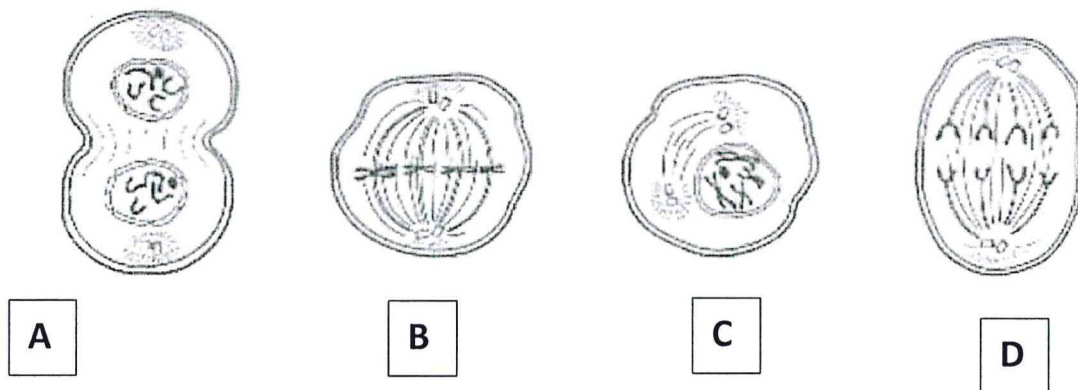
QUESTION 2**[10]**

Differentiate between the following terms:

- 2.1 Transcription and Translation (2)
 2.2 G1 and G2 phases of interphase (2)
 2.3 Intrinsic and Extrinsic pathways of apoptosis (2)
 2.4 lysosome and peroxisome (2)
 2.5 rho protein and sigma factors (2)

QUESTION 3**[8]**

Use the diagram below and identify the stages (A - D) of mitosis. For each stage give a brief description of what is happening.

**SECTION B (22 MARKS)****QUESTION 4****[22]**

4.1 Write the complementary sequence of the following section of DNA: (2)

5' AACGTCGATGCT 3'

4.2 The LacI gene is located before the Lac Operon. What is the function of the LacI gene product? (2)

4.3 Explain what an inducible operon is and name one. (2)

4.4 Discuss four differences between RNA and DNA (4)

4.5 Identify the enzyme that proof reads a DNA strand and explain how it achieves this function (4)

4.6 Define the principle of gel electrophoresis (2)

4.7 identify the molecules that can be run on gel electrophoresis (3)

4.8 Discuss safety considerations during agarose gel preparation (3)

SECTION C (50 MARKS)

QUESTION 5

[50]

- 5.1 Discuss the characteristics of the genetic code. (14)
- 5.2 Compare and contrast between the Lac Operon and Tryptophan (10)
- 5.3 Introns are non-coding regions found interspersed between coding exons. Outline the splicing pathway for GU-AG introns. (12)
- 5.4 Eukaryotic cells' DNA is organized in chromosomes and is stored in the nucleus, which is separated from the rest of the cell by a semipermeable membrane. Explain how a cell stores DNA in chromosomes. (14)

END OF EXAMINATION!

GENETIC CODE

		Second Letter									
		U		C		A		G			
1st letter	U	UUU	Phe	UCU	Ser	UAU	Tyr	UGU	Cys	3rd letter	
		UUC		UCC		UAC		UGC			
		UUA	Leu	UCA		UAA	Stop	UGA	Stop		
		UUG		UCG		UAG	Stop	UGG	Trp		
1st letter	C	CUU	Leu	CCU	Pro	CAU	His	CGU	Arg	3rd letter	
		CUC		CCC		CAC		CGC			
		CUA		CCA		CAA	Gln	CGA			
		CUG		CCG		CAG		CGG			
1st letter	A	AUU	Ile	ACU	Thr	AAU	Asn	AGU	Ser	3rd letter	
		AUC		ACC		AAC		AGC			
		AUA		ACA		AAA	Lys	AGA			Arg
		AUG		ACG		AAG		AGG			
1st letter	G	GUU	Val	GCU	Ala	GAU	Asp	GGU	Gly	3rd letter	
		GUC		GCC		GAC		GGC			
		GUA		GCA		GAA	Glu	GGA			
		GUG		GCG		GAG		GGG			