

# GWANDA STATE UNIVERSITY



FACULTY OF LIFE SCIENCES

DEPARTMENT OF CROP SCIENCES

BACHELOR OF SCIENCE HONOURS DEGREE IN CROP SCIENCE

CELL BIOLOGY AND GENETICS

LAS 1101

First Semester Final main Examination Paper

June 2019

This examination paper consists of 2 pages

**Time Allowed:** 3 hours  
**Total Marks:** 100  
**Special Requirements:** None  
**Examiner's Name:** A. Banda

## INSTRUCTIONS

1. Answer **all** questions in Section A
2. Answer **only two** questions in Section B

## MARK ALLOCATION

QUESTION	MARKS
SECTION A	60
SECTION B	40
<b>TOTAL ATTAINABLE MARKS</b>	<b>100</b>

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## Section A Compulsory

- 1a. Give five differences between DNA replication and transcription of RNA. [5]
- b. Describe the functions of DNA, mRNA, tRNA, rRNA. [8]
- c. Explain why DNA replication is referred to as 'semi-conservative replication.' [7]
- 2.

		Second base					
		U	C	A	G		
First base	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	
	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 ACC } 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	

Fig 2.1: The genetic code. The mRNA codons correspond to the 20 amino acids made by translation on the ribosomes. Three codons act as stop codons and under certain conditions the codon AUG initiates protein synthesis

- a. Using Figure 2.1, the genetic code, answer the following questions

- (i) What is the start codon? [1]
- (ii) What are the termination codons? [1]
- (iii) What is the sequence of codons in RNA when DNA contains the following sequences of bases, AGC, TAT, CGA, GTC, AAA? Further on what is the formed polypeptide? [5]

- b. What are the possible kinds of gametes produced by diploid organisms with the following genotypes?

- (i) MM (ii) mm (iii) mmpp (iv) MmPp (v) MmPP (vi) mmPp [13]

- 3a. Define the difference between the following terms:

- (i) Gene and allele.

- (ii) Dominant allele and recessive allele
- (iii) Homozygote and heterozygote
- (iv) Genotype and phenotype [8]

b. In hamsters, rough coat (R) is dominant to smooth coat (r) and black coat B is dominant to white coat b. A homozygous rough, black male is crossed with a smooth, white female hamster. What phenotypes would you expect in the F<sub>2</sub> generation and in what ratios would you expect them to occur. Show your working starting from F<sub>1</sub> generation. [12]

**Section B Answer only two questions in this Section**

4. Discuss the functional importance of the mitochondria and chloroplast inner membranes. [20]

5a. Compare and contrast the preparation of specimen for Electron microscope and Light microscope. [5]

b. Describe the procedures involved in the preparation of a rat Kidney section for electron microscope. Give reasons for the steps you take. [15]

6a. Define true breeding and describe how can a test cross be used to determine if an organism is true breeding. [5]

b. The F<sub>1</sub> generation genotype and phenotype of pea plants were TtpP (tall purple), Ttpp (tall white), ttpP (short purple), ttp (short white). Carry out a test cross, showing the possible parental genotype and phenotype [15]

7. Write short notes on the following:

a. Lysosomes [6]

b. Ribosomes [6]

c. Nucleus [8]