



**PAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES

DEPARTMENT OF NATURAL AND APPLIED SCIENCES

QUALIFICATION: BACHELOR OF SCIENCE	
QUALIFICATION CODE: 07BOSC	LEVEL: 6
COURSE CODE: GEN602S	COURSE NAME: GENETICS
SESSION: JANUARY 2023	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

SUPPLEMENTARY / SECOND OPPORTUNITY EXAMINATION PAPER	
EXAMINER (S):	Dr. Edosa Omoregie
MODERATOR:	Dr Jeya Kennedy

INSTRUCTIONS	
<ol style="list-style-type: none">1. Answer all questions in Sections A and B2. You may use a calculator3. Write clearly and neatly4. Number your answers correctly5. Draw diagrams wherever necessary	

PERMISSIBLE MATERIALS

Calculator

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

SECTION A (MULTIPLE CHOICE QUESTIONS, 2 MARKS FOR EACH QUESTION)

[30]

1. When a cell begins to prepare for cell division, DNA synthesis occurs during which of the following phases?
 - a) G1 phase
 - b) S phase
 - c) G2 phase
 - d) G0 phase

2. Mitotic cell division results in two cells that have:
 - a) n chromosomes that are genetically identical
 - b) n chromosomes that are genetically different
 - c) $2n$ chromosomes that are genetically identical
 - d) $2n$ chromosomes that are genetically different

3. Haemophilia is a sex-linked recessive trait in humans. If a father is a carrier, and their son is haemophiliac, but the mother is normal, her genotype must be?
 - a) X^hX^h
 - b) X^HX^h
 - c) X^HX^H
 - d) All of the above

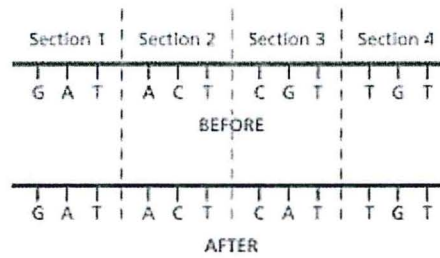
4. Genetic traits of seeds are noted as follows:
L = long, l = short, W = wrinkled, w = smooth, Y = yellow, y = white, R = ribbed, r = grooved.
Which of the following is the genotype for a short, wrinkled, yellow and grooved seed?
 - a) llWwyyrr
 - b) LLWWyYRr
 - c) LlWwYYRr
 - d) llWwYYrr

5. Which of the following is an autosomal recessive trait?
 - a) Duchenne muscular dystrophy
 - b) Lesch-Nyhan syndrome
 - c) Marfan syndrome
 - d) Cystic Fibrosis

6. Which of the following sequences will a strand of DNA with the sequence of base AACTTG have a complimentary strand?
 - a) CCAGGT
 - b) AACTTG
 - c) TTCAAG
 - d) TTGAAC

7. Which of the strand grows continuously towards the replication fork during the process of DNA replication?
- Lagging strand
 - RNA strand
 - Leading strand
 - Replicating strand
8. A human with Turner's syndrome would represent which of the following chromosomal condition?
- Diploid condition
 - Euploid condition
 - Aneuploid condition
 - Haploid condition
9. In the genetic code, the number of nucleotides in a single codon is?
- 2 nucleotides
 - 3 nucleotides
 - 4 nucleotides
 - 6 nucleotides
10. During the process of gene recombination, which of the following enzymes represses the action of transposase?
- Ligase
 - Polymerase
 - Helicases
 - Resolvase
11. Which of the following will not occur during post-transcriptional processing of RNA in eukaryotes?
- The splicing of introns
 - Addition of a poly-A at the 3' end
 - Removal of introns
 - Addition of a 7-methyl guanosine cap at the 5' end
12. During the process of splicing in gene expression, the removal of introns from RNA strands is by which group of enzymes:
- Primosomes
 - Resolvases
 - Transposase
 - Spliceosomes
13. What complementary DNA strand is the following RNA sequence transcribed from
5'AUCGACUACGAUCGC3'
- 5'ATCGACTACGATCGC3'
 - 5'ACCGACTACGAACGC3'
 - 5'AACGACCACGATCGC3'
 - 5'ATCGACCACGATCGC3'

14. In which section of DNA below is there a mutation?



- a) Section 1
- b) Section 2
- c) Section 3
- d) Section 4

15. Which of the following factors alter allele frequencies that bring about the most evolutionary change?

- a) Indiscriminating intraspecific mating
- b) Inbreeding
- c) DNA replication
- d) Genetic drift

SECTION B

[70]

16. a). Briefly differentiate gene mutation from chromosomal mutation.

(4)

b). Describe the structure of the messenger RNA.

(11)

17. With the aid of suitable diagram, briefly describe the process of mitotic division in a eukaryotic cell with emphasis on the changes taking place on the chromosome?

(10)

18. a). With the use of suitable diagrams, discuss the process of gene deletion, duplication, inversion and translocation in chromosomal mutations.

(8)

b). With reference to chromosomal mutation, number of chromosomes and phenotypic expression, discuss Fragile X Syndrome genetic disorder.

(7)

19. Using suitable molecular diagrams discuss the structure of the DNA double helix, including its subunits and the way in which they are bonded together indicating the antiparallel arrangements of the polynucleotide strands.

(15)

20. With the use of appropriate diagram, discuss the role of transposons, transposase and resolvases in gene recombination. Why are transposons referred to as important genetic materials?

(15)