

FEDERAL UNIVERSITY OF TECHNOLOGY OWERRI
SCHOOL OF SCIENCE
DEPARTMENT OF SCIENCE LABORATORY TECHNOLOGY
STM 307: GENETICS

HARMATTAN SEMESTER EXAMINATION 2014 / 2015 ACADEMIC SESSION

Instructions: Answer question one and four other questions, choosing at least two questions from section B and C

Date: 02/05/2015

Time: 2pm

Time allowed: 3 hours

SECTION A

1. a. State the laws of segregation of genes and independent assortment of genes.
b. Discuss the different dominance relations.
c. What is gene interaction?
d. Give a brief explanation of gene interaction with epistasis.

SECTION B

2. Briefly define the following terms: **(a)** gene **(b)** mutation **(c)** chromosome **(d)** DNA **(e)** transcription **(f)** genetics **(g)** genetic code.
3. a. State the assumptions that must be met for a population to be in Hardy-Weinberg equilibrium and the predictions given by the Hardy-Weinberg law.
b. Define the following; (i) Phenotype frequency (ii) Genotype frequency (iii) Allele frequency.
4. a. Explain the following sub-disciplines of genetics; (i) Transmission genetics (ii) Molecular genetics (iii) Population genetics
b. Differentiate between the following; (i) genotype and phenotype (ii) homozygous and heterozygous (iii) DNA and RNA

SECTION C

5. a. What are nucleotides?
b. Differentiate between the sugars of DNA and RNA
c. How does a purine differ from a pyrimidine?
d. Give the structure of the following purine bases; (i) adenine (ii) guanine
6. a. What three general characteristics must the genetic material possess?
b. Draw and label the three parts of a DNA nucleotide
c. The percentage of cytosine in a double-stranded DNA molecule is 40%.
What is the percentage of thymine?
7. a. Write short note on the DNA double helix.
b. Differentiate between the following secondary structural forms of DNA; (i) B-DNA (ii) A-DNA and (iii) Z-DNA
c. How does local variation arise in the DNA structure?