MAASAI MARA UNIVERSITY

SPECIAL/RESIT UNIVERSITY EXAMINATIONS 2021/2022 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER

SCHOOL OF NATURAL RESOURCE TOURIAM AND HOSPITALITY

BACHELOR OF ENVIRONMENTAL STUDIES (BIOLOGY AND HEALTH)

COURSE CODE: EBH 1107

COURSE TITLE: GENERAL GENETICS

DATE: 5TH APRIL,2022 **TIME: 0230-0430HRS**

INSTRUCTIONS TO CANDIDATES

ANSWER ALL QUESTIONS IN SECTION A AND ANY THREE IN SECTION B

Support your answers with relevant examples and illustrations and clearly show your calculations, where relevant.

This paper consists of 3 printed pages. Please turn over

SECTION A : Answer ALL questions in this section (25 MARKS)

1. In a large population of range cattle, the following ratios were observed, 49% red (**RR**), 42 % roan (**Rr**) and 9 % white (**rr**). What percentage of the gametes that give rise to the next generation of cattle will contain allele R? (***5 marks***).
2. State FIVE reasons that make the fruit fly (*Drosophila melanogaster*) an ideal candidate for genetic experimentation. (***5 Marks***).

3. The genotype distribution for a certain polymorphic locus was determined as follows; **AA** = 298, **Aa** = 489 and **aa** = 213. Calculate the frequencies of alleles **A** and **a** in the population. (***5 marks***).

4a. Explain the functions of mRNA and tRNA (***3 Marks***).

b. Explain the difference between a **test cross** and a **backcross** (***3 Marks***).

5. As a *Drosophila* research geneticist, you keep stocks of flies of specific genotypes. You have a fly that has normal wings (dominant phenotype). Flies with short wings are homozygous for a recessive allele of the wing – length gene. You need to know if this fly with normal wings is pure – breeding or heterozygous for the wing – length trait. What cross would you do to determine the phenotype, and what results would you expect for each possible genotype?

(***5 marks***).

SECTION B: Answer ANY THREE questions (45 MARKS).

6. Discuss the process of DNA replication and protein synthesis in eukaryotes. (***15 marks***).
7. Discuss any **FIVE** major deviations from Mendelian monohybrid and dihybrid inheritance patterns (***15 marks***).

8a. In a Mendelian gene for colour the allele **B** is dominant and has a frequency of **0.7**. Calculate the frequency of **BB**, **Bb** and **bb** genotypes **(5 Marks).**

8b. Discuss **FOUR** factors that influence distribution of alleles (genes) in a population (**10 Marks**).

9a. Discuss any **FOUR** major characteristics that make mitochondrial DNA an ideal molecular marker to study genetic diversity (**8 Marks**).

b. Describe any FOUR characteristics of the genetic code and state their significance in transmission of genetic information (**7 Marks**)

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