

BOWEN UNIVERSITY, IWO
COLLEGE OF AGRICULTURE, ENGINEERING AND SCIENCE
PURE AND APPLIED BIOLOGY PROGRAMME
2022/2023 FIRST SEMESTER EXAMINATION
BLY 303: GENETICS AND EVOLUTION

Answer question ONE and any two others.

Time allowed: 2hrs 20min

1. (a) (i) Define the following terms:
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|--------------------------------|--------------------------------------|
| (a) Phenotype <i>(1 mark)</i> | (b) Back cross <i>(1 mark)</i> |
| (c) Test cross <i>(1 mark)</i> | (d) Sex-linked trait <i>(1 mark)</i> |
- (ii) In 40 clocked plants *Mimibilis jalopa*, red flower (R) is dominant over white flower (r). When a red flower is crossed with a white flower, the f₁ hybrids are pink, what will be the f₂ genotypic and phenotypic ratio if the f₁ hybrids are interbred? *(6 marks)*
- (b) (i) Define the following terms;
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|---|--------------------------------------|
| (a) Genetic recombination <i>(1 mark)</i> | (b) Allele frequency <i>(1 mark)</i> |
| (c) Gene mapping <i>(1 mark)</i> | (d) Linked genes <i>(1 mark)</i> |
- (ii) Explain briefly the term Non – Mendelian Inheritance *(2 marks)*
- (iii) List four Non – Mendelian Inheritance *(4 marks)*
- (c) Briefly describe an experiment that shows that DNA is the genetic material *(10 marks)*
2. (a) Write short notes on the following:
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|---------------------------|------------------|
| (i) Sex-limited trait | <i>(5 marks)</i> |
| (ii) Sex-influenced trait | <i>(5 marks)</i> |
- (b) Mr. and Mrs. Smith both have widow's peaks (dominant). Their first child also has a widow's peak, but their second child doesn't. Mr. Smith accuses Mrs. Smith of being unfaithful to him. Is he necessarily justified? Why or why not? Work the genetics problem predicting the frequencies of the versions of this trait among their prospective children. *(10 marks)*
3. (a) Explain the term 'Gene pool' *(3 marks)*
- (b) State the principle upon which Hardy – Weinberg equilibrium is based *(3 marks)*
- (c) When the frequency of dominant and recessive alleles in a population remains constant from generation to generation. State six conditions that must be in existence *(6 marks)*
- (d) In a population of 30,000, 10 persons are albino. Calculate the frequency of the homozygous dominant genotype and the frequency of the heterozygous genotype *(8 marks)*
4. (a) Write short notes on the following:
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|--------------------------------------|------------------|
| (i) Mutation and Evolution | <i>(5 marks)</i> |
| (ii) Natural Selection and Evolution | <i>(5 marks)</i> |
| (iii) Speciation: causes and types | <i>(4 marks)</i> |
- (b) Clearly discuss at least Six advantages offered by Molecular Data when studying the process and patterns of Evolution *(6 marks)*
5. (a) Give an account of the Nucleic acid *(8 marks)*
- (b) Explain the term 'Gene Expression' and describe its stages *(8 marks)*
- (c) Differentiate between Conjugation and Transduction *(4 marks)*