

Bago University
Department of Zoology
Second Semester Examination, September 2019

Third Year (B.Sc)
(Zoology Specialization)
Answer ALL questions

Zool. 3114
Mendelian Genetics
Time Allowed: (3) Hours

I. State TRUE or FALSE to the following statements. (10 marks)

1. Each pair of traits in the F₂ generation is 3:1 ratio in Mendelian experiments.
2. Tyrosinase is active at the temperature below 33° C for dark pigmentation.
3. Recessive alleles may be deleterious if it is in homozygotes.
4. The dash in the genotype of the parental female indicates that one allele is unknown.
5. The testcross parent is always heterozygous.
6. There are eight sexes or mating types in *Paramecium bursaria*.
7. Plants have sexes; male and female portions of a flower.
8. ZO method of sex determination in insects for heterogametic female.
9. Male bees are known to develop parthenogenetically.
10. The environment determines sterility and fertility of female bees and no alteration of sex.

II. Complete the following statements with appropriate words. (10 marks)

1. Children resemble their parents is the example of -----.
2. The enzyme, tyrosinase will be in active if the temperature is above -----.
3. Samples from a population of individuals often deviate from the ----- ratios.
4. There is one way in which 2 heads may appear in ----- tosses of a coin.
5. The blood group ---- indicates the parents of dominant I^A allele and co dominant allele I^B.
6. The phenotypic ----- of two black short parents produces 9:3:3:1 ratio.
7. The importance of sex provides for the great amount of genetic -----.
8. The better adapted types usually survive to reproduce their kind in the ----- process.
9. A trait governed by a sex -linked ----- gene is found more frequently in the female than in the male of the species.
10. Sex-linked inheritance of XY and XO methods occurred in heterogametic -----.

III. Answer ALL questions (10 marks)

1. Name different characters used in Mendel's experiments.
2. State about monofactorial cross.
3. Tabulate the genotype and phenotype of M-N blood group system.
4. Write short notes on combining probability.
5. State the effect of transformer gene.

IV. Answer ALL questions (20 marks)

1. Describe about the pure line in homozygous.
2. Heterozygous black guinea pigs (*Bb*) are crossed among themselves. What is the probability of the first three offspring being alternately black-white-black or white-black-white?
3. In foxes, silver-black coat color is governed by a recessive allele *b* and red color by its dominant allele *B*. Determine the genotypic and phenotypic ratios expected from the following mating. (a) pure red x carrier red, (b) carrier red x silver-black.
4. State the heterogametic males in sex chromosome mechanisms.

V. Answer ANY THREE questions

(30 marks)

1. Mention about the six different single gene crosses.
2. The shaped of radishes may be long ($S^L S^L$), round ($S^R S^R$), or oval ($S^L S^R$). If long radishes are crossed to oval radishes and the F1 then allowed crossing at random themselves, what phenotypic ratio is expected in the F2?
3. Thalassemia is hereditary disease of the blood of humans results in anemia. Severe anemia (thalassemia major) is found in homozygotes ($T^M T^M$) and a milder form of anemia (thalassemia minor) is found in heterozygotes ($T^M T^N$). Normal individuals are homozygous $T^N T^N$. If all individuals with thalassemia major die before sexual maturity, what proportion of the adult F1 from marriages of thalassemia minors to normal would be expected to be normal, (b) what fraction of the adult F1 from marriages of minors to minors would be expected to be anemic?
4. A dominant allele L governs short hair in guinea pigs and its recessive allele l governs long hair. Codominant alleles at an independently assorting locus specify hair color, such that $C^Y C^Y$ = yellow, $C^Y C^W$ = cream, and $C^W C^W$ = white. From matings between dihybrid short, cream pigs ($Ll C^Y C^W$), predict the phenotypic ratio expected in the progeny. Using branching system.
5. Discuss about the haplodiploidy from the importance of sex.
6. A narrow reduced eye called "bar" is a dominant sex-linked condition (B) in *Drosophila* and the full wild-type eye is produced by its recessive allele B^+ . A homozygous wild-type female is mated to a bar-eyed male. Determine the F1 and F2 genotypic and phenotypic expectations.
