Progressive Education Society's
Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16
(Autonomous)
End Semester Examination: Nov./Dec. 2023
Faculty: Science and Technology

Program: B.Sc. Biotech (04) **Semester: III** **SET: B**
Program (Specific): Biotechnology **Course Type: Core**
Class: S. Y. B.Sc. **Max. Marks: 35**
Name of the Course: Genetics
Course Code: 23 BBT-303 **Time: 2 Hr**

Instructions to the candidate:

1) ***There are 4 sections in the question paper. Write each section on separate page.***
2) ***All Sections are compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***Draw a well labelled diagram wherever necessary.***

SECTION: A

Q1) Answer any <u>FIVE</u> of the following (5/6) **5**

1. Give a formula to calculate recombination frequency.
2. What are Somatic Mutations?
3. Define Expressivity.
4. Explain missense mutation.
5. Define Pleotropism.
6. Define Non-disjunction.

SECTION: B

Q2) Answer any <u>FIVE</u> of the following (5/6) **10**

1. What is the significance of Barr bodies?
2. Explain law of segregation.
3. What are the consequences of spontaneous DNA mutations?
4. Mention two applications of Genetic counselling.
5. Explain autosomal recessive trait with an example.
6. How does a deletion cause pseudo-dominance

SECTION: C

Q3) Answer any <u>TWO</u> of the following (2/4) **8**

1. With an example explain three point cross.
2. Why Mendel was successful in his experiments? Justify with reasons.
3. Elaborate the concept of frame shift mutation with help of an example.
4. What are genetic disorders? Explain any two autosomal disorder with examples.

[P.T.O]

SECTION: D

Q4) Answer any <u>TWO</u> of the following (2/4) **12**

1. With the help of a dihybrid cross Explain law of Independent assortment

2. Joanna has short fingers (brachydactyly). She has two older brothers who are identical twins; they both have short fingers. Joanna's two younger sisters have normal fingers. Joanna's mother has normal fingers, and her father has short fingers. Joanna's paternal grandmother (her father's mother) has short fingers; her paternal grandfather (her father's father), who is now deceased, had normal fingers. Both of Joanna's maternal grandparents (her mother's parents) have normal fingers. Joanna marries Tom, who has normal fingers; they adopt a son named Bill who has normal fingers. Bill's biological parents both have normal fingers. After adopting Bill, Joanna and Tom produce two children: an older daughter with short fingers and a younger son with normal fingers.
   (a) Using correct symbols and labels, draw a pedigree illustrating the inheritance of short fingers in Joanna's family.
   (b) What is the most likely mode of inheritance for short fingers in this family?

3. Red colour in wheat kernel is produced by genotype RB,white by a double recessive genotype rrbb, the genotype Rbb and rrB produces brown kernels. Homozygous red varietyis crossed to a white variety. What phenotypic ratio is expected in F_1 and F_2 progeny?
4. In guinea pigs, white coat (w) is recessive to black coat (W) and wavy hair (v) is recessive to straight hair (V). A breeder crosses a guinea pig that is homozygous for white coat and wavy hair with a guinea pig that is black with straight hair. The F_1 are then crossed with guinea pigs having white coats and wavy hair in a series of testcrosses. The following progeny are produced from these testcrosses:
   (a) black, straight 30
   (b) black, wavy 10
   (c) white, straight 12
   (d) white, wavy 31
   (e) total 83

(a) Are the genes that determine coat color and hair type assorting independently?

(b) If the genes are not assorting independently, what is the recombination frequency between them?