

PARUL UNIVERSITY
FACULTY OF APPLIED SCIENCE
B.Sc., Summer 2017-18 Examination

Semester: 2, 4
Subject Code: 11102151
Subject Name: Molecular Genetics

Date: 16-05-2018
Time: 02:00PM to 04:30PM
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

- Q.1. A) Brief note (4x2) (Each of 04 marks) (08)**
 (a) Describe "Mendel's law of Independent Assortment" with example.
 (b) Plumage colour in mallard ducks is dependent upon a set of three alleles: M^R for restricted mallard pattern, M for mallard, and m dusky mallard. The dominance hierarchy is $M^R > M > m$. Determine the phenotypic ratios expected in the F1 from the following crosses : (a) $M^R M^R \times M^R M$, (b) $M^R m \times M^R m$
- Q.1. B) Answer the following questions (Any two) (04)**
 (a) Short answer question (Each of 02 marks) (04)
 1. A hypothetical series of 8 multiple alleles is known for a certain locus. How many genotypic classes are possible?
 2. How many different kinds of gametes could be produced by an individual with the genotype BBFF. (04)
 (b) Write a short note on "Genetic maternal effect". (04)
 (c) Differentiate "Incomplete dominance" and "Co-dominance". (04)
- Q.2. A) Answer the following questions. (04)**
 (a) Fill in the blanks. (Each of 02 marks) (04)
 1. Linkage groups in the (a) human male _____ (b) human female _____
 2. When a carrier female for red-green colour-blindness is crossed with a diseased male, _____ percent of the male offspring are colour-blind.
 (b) Describe the different ways of crossing over with the help of diagram. (04)
- Q.2. B) Answer the following questions (Any two) (03)**
 (a) Short note/ Multiple choice questions. (Each of 01 marks) (03)
 1. Mitotic cell division results in two cells that have:
 A. n chromosomes and are genetically identical B. n chromosomes and are genetically different
 C. $2n$ chromosomes and are genetically identical D. $2n$ chromosomes and are genetically different
 2. Long radishes crossed with round radishes result in all oval radishes. This type of inheritance is:
 A. Multiple alleles B. Complete dominance
 C. Co-dominance D. Incomplete dominance.
 3. A pedigree chart shows:
 A. The genotypic ratios of the offspring B. The types of gametes produced by the parents
 C. Which genes are co-dominant D. The pattern of inheritance of a specific gene
 (b) A woman of blood group A marries a man of blood group O. There are three children in the family. The children's blood types are O, A and AB. Which child was definitely adopted? (03)
 Explain.
 (c) Write a short note on "Pleiotropy". (03)
- Q.3. A) Describe structural changes in chromosomes with the help of diagram. (08)**
Q.3. B) Answer the following questions (Any two) (04)
 (a) Brief note (Each of 02 marks) (04)
 1. Gene Pool
 2. C value
 (b) Define "Linkage" and its types? (04)
 (c) Describe "Aneuploidy" with proper examples. (04)

Q.4. A) Answer the following questions.

- (a) Brief note (2x2) (Each of 02 marks) **(04)**
1. Enlist the causing agents of evolution.
2. Give one example of each: X-linked trait and Y-linked trait
- (b) Discuss the three different modes of "Natural Selection" **(04)**

Q.4. B) Answer the following questions (Any two)

- (a) Short note/ Multiple choice questions. (Each of 01 marks) **(03)**
1. Pleiotropism is the condition of
a. a single gene having multiple effects b. interaction of multiple alleles
c. multiple gene inheritance d. a single gene being influenced by several traits
2. In the F1 generation of a monohybrid cross, the phenotypic ratio would be:
a. 3:1 b. 1:2:1
c. 9:3:3:1 d. 2:1
3. Down syndrome is a _____.
a. Monosomy b. Trisomy
c. Tetrasomy d. Disomy
- (b) Describe Hardy-Weinberg equilibrium in any population? **(03)**
(c) Describe the stages of "Mitosis" diagrammatically only. **(03)**