

PARUL UNIVERSITY
PARUL INSTITUTE OF APPLIED SCIENCES
MID SEMESTER INTERNAL EXAMINATION, April 2018
B. Sc. Semester II/IV

Subject: Biotechnology/Microbiology/Biochemistry

Paper Code: 11102151

Title of the paper: Molecular Genetics

Date: 02/04/2018

Time: 10:00-11:30AM

Maximum Marks: 40

Instructions:

- 1. All questions are compulsory and options are given in first and second question only.**
 - 2. Numbers to the right of question indicate the marks of respective question.**
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Q. 1 Attempt any one question of the following. **(08)**

- (i) Write an essay on Mendel's laws of inheritance with suitable example.
- (ii) Four comb shapes namely rose, pea, walnut and single in poultry are known to be governed by two gene loci. The genotype R-P-produces walnut comb, R-pp produces rose comb, rrP-produces pea comb, rrrp produces single comb. Determine the ratio of comb types that would be expected in offspring from each of the following crosses:
(1) Rrpp×RrPP (2) rrPp×RrPp (3) RrPp×rrpp (4) rrPP×RRPp

Q. 2 Attempt any three questions of the following. **(12)**

- (i) A colorblind male marries a carrier female. What are the offspring's genotypes and phenotypes? (C = normal, c = colorblind)
- (ii) Explain "Genetic maternal effect" with example of cross between a dextral homozygous female with dextral heterozygous male.
- (iii) What is Pleiotropy? Discuss briefly with a suitable example.
- (iv) Define "Incomplete dominance" and "Co-dominance".
- (v) Differentiate between two types of linkage with example.

Q. 3 Do as directed. Attempt all five questions. **(05)**

- (i) Define "Phenotype".
- (ii) Give one example of each: sex influenced and sex limited traits.
- (iii) What is a test cross?
- (iv) A hypothetical series of 5 multiple alleles is known for a certain gene locus. How many genotypes are possible?
- (vi) How many linkage groups are there in an organism with 22 as diploid no. of chromosomes (2n=22)?

Q. 4 Write correct option in your answer sheet for following 15 multiple choice questions. **(15)**

MCQ 1 The expression of a gene in an individual is termed the

- (A) genotype of the individual (B) linked gene
(C) locus (D) phenotype of the individual

MCQ 2 The position of a gene on a chromosome is known as the gene's

- (A) centromere (B) locus
(C) phenotype (D) genotype

MCQ 3 Hemophilia is a sex-linked recessive trait in humans. If a female haemophiliac married a normal male, what percentage of their male offspring would be expected to have haemophilia?

- (A) 100 % (B) 50%

- (C) 25% (D) 0%
- MCQ 4 In tobacco, if the diploid number of chromosomes is 48, how many chromosomes will be found in a pollen grain?
(A) 24 (B) 12
(C) 96 (D) 48
- MCQ 5 Mitosis involves separation of only sister chromatids while meiosis involves?
(A) Also separation of only sister chromatids. (B) Separation of sister chromatids twice.
(C) Separation of only homologous chromosomes. (D) Separation of homologous chromosomes as well as sister chromatids.
- MCQ 6 An example of a genotype is:
(A) T and t (B) X and Y
(C) TtHH (D) A tall pea plant
- MCQ 7 Which blood type would not be possible for children of a type AB mother and a type A father?
(A) O (B) A
(C) B (D) AB
- MCQ 8 An extra finger in humans is rare but is due to a dominant gene. When one parent is normal and the other parent has an extra finger but is heterozygous for the trait, what is the probability that the first child will be normal?
(A) 0% (B) 25%
(C) 50% (D) 100%
- MCQ 9 A pedigree chart shows:
(A) The genotypic ratios of the offspring (B) The pattern of inheritance of a specific gene
(C) The types of gametes produced by the parents (D) Which genes are co-dominant
- MCQ 10 Flower colour in snapdragons is an example of
(A) Co-dominance (B) Multiple alleles
(C) Sex linkage (D) Incomplete dominance
- MCQ 11 In the F₁ generation of a monohybrid cross, the genotypic ratio would be
(A) 3:1 (B) 1:2:1
(C) 2:1 (D) 9:1
- MCQ 12 An organism with two identical alleles of a gene is called
(A) Homozygous (B) Heterozygous
(C) Hybrid (D) Dominant
- MCQ 13 How many different kinds of gametes will be produced by a plant having the genotype AABbCC?
(A) 3 (B) 4
(C) 9 (D) 2
- MCQ 14 If gene expresses itself than its penetrance is
(A) 100% (B) 50%
(C) 0% (D) 25%
- MCQ 15 The cytoplasm of an animal cell is divided by means of
(A) A cleavage furrow (B) A cell plate
(C) A cell membrane (D) Mitosis