22BTU207N

**PSG COLLEGE OF ARTS & SCIENCE**
(AUTONOMOUS)

**BSc DEGREE EXAMINATION DECEMBER 2025**
(Second Semester)

Branch - **BIOTECHNOLOGY**

## GENETICS

Time: Three Hours Maximum: 75 Marks

**SECTION-A (10 Marks)**
Answer **ALL** questions
**ALL** questions carry **EQUAL** marks (10 × 1 = 10)

| Module No. | Question No. | Question | K Level | CO |
|---|---|---|---|---|
| 1 | 1 | What is the correct term for genes found on the homologous region of the X and Y chromosomes?<br>a) Sex-linked genes b) Autosomal genes<br>c) Partially sex-linked genes d) Y-linked genes | K1 | CO1 |
| | 2 | Which of the following characteristics of pea plants was not used by Mendel in his experiments?<br>a) seed colour b) seed shape<br>c) pod length d) flower position | K2 | CO1 |
| 2 | 3 | Which of the following could be due to duplication?<br>a) Co-dominance b) Dominance<br>c) Incomplete dominance d) Pleiotropy | K1 | CO1 |
| | 4 | Histones are rich in<br>a) Lysine & arginine b) Lysine & histidine<br>c) arginine & histidine d) leucine & valine | K2 | CO2 |
| 3 | 5 | Exchange of genetic material takes place in<br>a)vegetative reproduction b) asexual reproduction<br>c) sexual reproduction d) budding | K1 | CO2 |
| | 6 | Who coined the term "heterosis"?<br>a) Gregor Mendel b) Charles Darwin<br>c) G.H. Shull d) Gregor Mendel | K2 | CO2 |
| 4 | 7 | In human genetics, an alternative form of a gene is known as a(n):<br>a) Allele b) Locus<br>c) Phenotype d) Genotype | K1 | CO1 |
| | 8 | Which area of the body is typically affected first by the muscle weakness in DMD?<br>a) Arms and shoulders b) Neck and respiratory muscles<br>c) Hips, pelvic area, and thighs d) Fingers and hands | K2 | CO2 |
| 5 | 9 | Which of the following conditions is NOT required for a population to be in Hardy-Weinberg equilibrium?<br>a) No mutation. b) Random mating<br>c) A large population size d) Natural selection | K1 | CO2 |
| | 10 | What is the founder effect?<br>a) A random evolutionary change that affects a small group of individuals<br>b) When a small group of individuals from a larger population colonizes a new area<br>c) A large group of individuals from a smaller population leaving to colonize a new area<br>d) The process of random mating within a population. | K2 | CO2 |

**Cont...**

## SECTION - B (35 Marks)

Answer **ALL** questions

**ALL** questions carry **EQUAL** Marks (5 × 7 = 35)

| Module No. | Question No. | Question | K Level | CO |
|---|---|---|---|---|
| 1 | 11.a. | State Mendel's Law of Dominance. | K2 | CO1 |
| | | (OR) | | |
| | 11.b. | Discuss what a sex-linked trait is and provide an example, such as hemophilia. | | |
| 2 | 12.a. | Discuss the role of aneuploids in genetics, with reference to plants. | K3 | CO2 |
| | | (OR) | | |
| | 12.b. | Explain different types of chromosomal rearrangements, with example and their potential impact. | | |
| 3 | 13.a. | Illustrate cytoplasmic male sterility. | K3 | CO2 |
| | | (OR) | | |
| | 13.b. | Narrate the role of heterosis and genetic basis of heterosis. | | |
| 4 | 14.a. | Explain the general principles of managing an acute episode of an inborn error of metabolism. | K2 | CO3 |
| | | (OR) | | |
| | 14.b. | Analyze how mutations in mitochondrial DNA lead to a failure in energy production. | | |
| 5 | 15.a. | Compare and contrast the roles of mutation and sexual reproduction in creating genetic variation in population. | K3 | CO4 |
| | | (OR) | | |
| | 15.b. | Explain Genetic drift with examples. | | |

## SECTION -C (30 Marks)

Answer **ANY THREE** questions

**ALL** questions carry **EQUAL** Marks (3 × 10 = 30)

| Module No. | Question No. | Question | K Level | CO |
|---|---|---|---|---|
| 1 | 16 | Elaborate chromosomal theory of inheritance and explain how it relates to Mendelian laws. | K3 | CO1 |
| 2 | 17 | Compile the chromosomal abnormality that causes Down syndrome and explain common phenotypic characteristics. | K3 | CO2 |
| 3 | 18 | Assess the types of structural variations occur in chloroplast genomes across different or single species? | K3 | CO2 |
| 4 | 19 | Examine the inheritance pattern of X-linked recessive disorders, explaining why they primarily affect males. | K4 | CO3 |
| 5 | 20 | Explain the key sources of genetic variation in a population, such as mutation, recombination, and random mating. | K4 | CO4 |

Z-Z-Z END