

QP CODE: 25050436



Reg No :

Name :

MSc DEGREE (CSS) EXAMINATION, DECEMBER 2025

First Semester

M Sc MOLECULAR BIOLOGY AND GENETIC ENGINEERING

**Core Courses - BS030102 - MOLECULAR ORGANIZATION OF CHROMOSOMES;
THEORY OF HEREDITY**

2019 Admission Onwards

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Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

Weight 1 each.

1. Explain the structure of a chromosome.
2. Sex can be determined by genes. Explain.
3. Describe Rosalind Franklin contribution in DNA research.
4. What do you mean by cell cycle?
5. Describe the major checkpoints in cell cycle.
6. What do you mean by tissue specific polyploidy?
7. What are autotetraploids?
8. How do inversions cause phenotypic effects?
9. Define C value paradox.
10. State the function of salivary gland giant chromosome.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

Weight 2 each.

11. Explain how Bridges's study of nondisjunction in *Drosophila* helped prove the chromosome theory of inheritance.
12. How do the mechanisms that compensate for different doses of the X chromosome in the two sexes differ between humans and *Drosophila*?





13. What two processes unique to meiosis are responsible for genetic variation? At what point in meiosis do these processes take place?
14. What is the end-of-chromosome problem for replication? Why, in the absence of telomerase, do the ends of chromosomes get progressively shorter each time the DNA is replicated?
15. Account on the chemical composition of chromosome.
16. What is the difference between primary Down syndrome and familial Down syndrome? How does each type arise?
17. How are the single-stranded regions of DNA at the ends of human chromosomes protected from degradation by nucleases and other enzymes?
18. A geneticist examines an ear of corn in which most kernels are yellow, but he finds a few kernels with purple spots. Give a possible explanation for the appearance of the purple spots in these otherwise yellow kernels, accounting for their different sizes.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

Weight 5 each.

19. Explain the molecular details of eukaryotic DNA replication.
20. Explain in detail relationship between nucleosomes, 30nm fiber and the scaffold structure with respect to the organization of DNA in nucleus.
21. What are the different types of aberrations that may occur in a chromosome?
22. What are transposable elements? Give a detailed account on various types of transposable elements in prokaryotes.

(2×5=10 weightage)

