

**M.Sc. 3rd Semester Examination, 2022**

**BOTANY**

*( Cell Biology and Genetics/Biotechnology )*

**PAPER — BOT-301**

*Full Marks : 50*

*Time : 2 hours*

*The figures in the right hand margin indicate marks*

*Candidates are required to give their answers in their own words as far as practicable*

**UNIT — I**

*( Cell Biology and Genetics )*

**A. Answer any two of the following : 2 × 2**

- 1. How do the genes in Complementary gene action deviate in behaviour from Mendelism ?**

*( Turn Over )*

2. What are major genes and minor genes in polygenic inheritance ? Mention their significance.
3. State with reasons two means of detecting the inheritance of a character as extra-nuclear.
4. What is cell cycle check point ?

B. Answer any *two* of the following : 4 × 2

5. What is population bottleneck ? How is it related to genetic drift and founder effect ?  
2 + 2
6. What is maternal inheritance ? Briefly explain with a suitable example.  
2 + 2
7. What is Lyon hypothesis ? How does dosage compensation vary in different organisms ?  
2 + 2
8. Define coefficient of coincidence of crossing over and its reverse phenomenon. How is linkage mapping done ?  
2 + 2

C. Answer any *one* of the following : 8 × 1

9. Describe the ultrastructural features of eukaryotic nucleus highlighting the pore complex and its role in trafficking.

10. Illustrate the constancy of allele and genotype frequency in a population in the light of Hardy-Weinberg hypothesis. Mention the roles of different factors affecting this constancy.

[ *Internal Assessment – 5 Marks* ]

(separately taken).

## UNIT – II

( *Biotechnology* )

D. Answer any *two* of the following : 2 × 2

11. What is a marker gene ? How does it work ?

12. How does a cloning vector differ from an expression vector ?

13. What is Blue/White selection ? How does it work ?

14. Explain heterosis with transgressive inheritance.

E. Answer any *two* of the following : 4 × 2

15. Define C DNA and Genomic library. Give a schematic presentation of constructing these two libraries. 2 + 2

16. Briefly elucidate the mechanism of mRNA splicing. 4

17. What is the basis of categorizing the nutrients used in *in vitro* culture as 'macro' and 'micro' ? Mention the utilities of two of each of macro- and micro-elements in plant development. 2 + 2

18. Give a brief account of the role of plant introduction in breeding program and mention its demerits. 3 + 1