

M.Sc. (Ag.) Examination 2017
Semester-II
Genetics and Plant Breeding
Course: GPB-502
(Principles of Cytogenetics)

Time : 3 Hours

Full Marks : 50

Questions are of value as indicated in the margin.

Answer **any five** questions among the following.

1. (a) Define chromosome morphology. Describe morphological features of chromosomes as seen under light microscope.
(b) Assuming $2n=4$, describe the following stages of meiosis with the help of suitable diagram(s):- (i) Zygotene, (ii) pachytene, (iii) diplotene, (iv) diakinesis, (v) Metaphase-I, (vi) Anaphase-I, (vii) Anaphase-II, (viii) Metaphase-II (1+3)+6=10
2. (a) Define translocation, and give its different types.
(b) Draw pachytene configurations in translocation heterozygote and discuss its chromosome disjunction at Anaphase I (with gametic output, without crossing over). (1+2)+(6+1)=10
3. (a) Define heteroploidy. Prepare a list of different numerical chromosome aberrations.
(b) Briefly describe the modes of origin and production of aneuploids and their application in crop improvement. (1+3)+(3+3)=10
4. What are the common aneuploid analyses for locating genes on a particular chromosome? Give a brief description of any one of these techniques. 2+8=10
5. (a) What is the essential feature of the cytology of tetraploids? What do you mean by random chromosome segregation and random chromatid segregation?
(b) Describe with suitable diagram, the gametic output under random chromosome assortment for a simplex individual. Also predict the zygotic frequencies on selfing of a such simplex plant. (1+2)+(5+2)=10
6. (a) What is fertilization barrier in crop plants? Mention and discuss its different types.
(b) What are the techniques to overcome barriers in crop plants? (1+4+5)=10

P.T.O.

7. Differentiate between the following (*any five*) 2×5=10
- i) Trisomics and triploids
 - ii) Karyotype and idiotypic
 - iii) Haploids and monoploids
 - iv) Secondary and tertiary trisomics
 - v) Homologous and homoeologous chromosomes
 - vi) Dihaploid and doubled haploids
 - vii) Diploid and amphidiploid
 - viii) Autopolyploids and allopolyploids
8. Write short notes on the following (*any five*) 2×5=10
- i) Paracentric inversion
 - ii) Evolution of *Gossypium hirsutum*
 - iii) Synaptonemal complex
 - iv) Chiasma terminalization
 - v) Raphanobrassica
 - vi) Accessory chromosome
 - vii) Isochromosome
 - viii) Wide hybridization
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