

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 7909

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Unique Paper Code : 2163010021

Name of the Paper : Advances in Genetics, Genomics and Plant Breeding

Name of the Course : **B.Sc. (Hons.) Botany**

Semester : VIII

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question 1 is compulsory.
3. Only **four** questions are required to be attempted in all.
4. Attempt all parts of every question together.

Q.1. (a) Define the following (*any five*):

(1X5=5)

- i. Introgression
- ii. Aneuploidy
- iii. Self-incompatibility
- iv. Heterosis
- v. Gene tagging
- vi. Base editing
- vii. Apomixis

(b) Expand (*any five*):

(1X5=5)

- i. NGS
- ii. FISH
- iii. BSA
- iv. MAS
- v. gRNA
- vi. ChIP
- vii. PAM

(c) State True/False for the given statements (*any five*): (1X5=5)

- (i) Heterochromatin is loosely packed and gene-rich.
- (ii) Alien gene transfer involves genes from closely related species only.
- (iii) Aneuploidy involves change in entire sets of chromosomes.
- (iv) Wild germplasm may carry both beneficial and undesirable traits.
- (v) Metagenomics studies genomes of isolated pure cultures only.
- (vi) Self-incompatibility promotes cross-pollination.

P.T.O.

Q2. Differentiate between the following (*any three*):

(5×3=15)

- (i) GISH and FISH
- (ii) Genomics and Epigenomics
- (iii) Heterosis and Inbreeding Depression
- (iv) Gene editing and Gene silencing
- (v) Pedigree analysis and Genetic counselling

Q3. Write short notes on the following (*any three*):

(5×3=15)

- (i) Plant breeders and Farmers' rights
- (ii) Applications of Genetically Modified Organisms
- (iii) Packaging of DNA in Eukaryotes
- (iv) Application of transposons in mutagenesis
- (v) RNA interference (RNAi)

Q4. (a) "Epigenetic variation provides an additional layer of heritable diversity." Discuss its significance in plant breeding (7)

(b) How do chromosomal changes contribute to evolution as well as challenges in crop improvement? Discuss with examples. (8)

Q5. (a) Discuss the ethical, legal and social implications of genetic analysis and research, particularly with reference to human welfare with suitable example. (8)

(b) What are primary, secondary and tertiary gene pools? Discuss how gene pools can be utilized to introduce novel traits into cultivated crops. (7)

Q6. (a) What is complementation? Discuss the *cis-trans* complementation analysis with suitable example. (8)

(b) Explain why transcriptome profiling is essential for understanding plant responses under stress conditions? (7)