

BOTANY

Paper – II

Time Allowed : **Three Hours**

Maximum Marks : **200**

Question Paper Specific Instructions

Please read each of the following instructions carefully before attempting questions :

*There are **EIGHT** questions in all, out of which **FIVE** are to be attempted.*

*Questions no. **1** and **5** are compulsory. Out of the remaining **SIX** questions, **THREE** are to be attempted selecting at least **ONE** question from each of the two Sections A and B.*

Attempts of questions shall be counted in sequential order. Unless struck off, attempt of a question shall be counted even if attempted partly. Any page or portion of the page left blank in the Question-cum-Answer Booklet must be clearly struck off.

All questions carry equal marks. The number of marks carried by a question/part is indicated against it.

Neat sketches may be drawn, wherever required.

*Answers must be written in **ENGLISH** only.*

SECTION A

Q1. Write short notes on the following : **8×5=40**

- (a) Nucleosome modification and its significance 8
- (b) Behaviour and significance of B-chromosome in genetic variation 8
- (c) Importance of RNA molecule and its role in the origin and evolution of living organisms 8
- (d) Types and applications of molecular markers 8
- (e) Calculate the mean, standard error and coefficient of variation from the following data : 8

Number of flowers/plant (x)	4	6	5	8	7	9
Number of plants (y)	3	6	5	5	9	4

- Q2.**
- (a) Discuss the structure and function of synaptonemal complex, mentioning its location. State the different structural types of DNA with outline sketches. 15+5=20
 - (b) Describe *lac* operon and its negative as well as positive controls, with suitable diagrams. 10
 - (c) Discuss the molecular mechanism of base analogue incorporation and its effects. 10
- Q3.**
- (a) Describe the steps involved in T-DNA processing and transfer from *Agrobacterium* cell to the host plant nuclear genome, with suitable diagram. Add a note on the types and advantages of apomixis. 15+5=20
 - (b) Distinguish between paracentric and pericentric inversions with diagrams. Explain with sketches the different meiotic products resulting from a single crossover within a paracentric and pericentric loop. 10
 - (c) Explain the molecular mechanism of point mutation. 10
- Q4.**
- (a) What are prions and where do they exist ? Explain the process of prion replication and role of cofactors in prion infectivity. 4+8+8=20
 - (b) Discuss the meiotic configurations in a translocation heterozygote (considering 2 pairs of chromosomes involved in translocation), with diagrams, and its subsequent effects on pollen fertility. 8+2=10
 - (c) Write an account on the applications of 'z' and chi-square tests in plant breeding programme. 5+5=10

SECTION B

- Q5. Write short notes on the following :** **8×5=40**
- (a) Roles of abscisic acid and cytokinin in the regulation of seed dormancy 8
 - (b) How can longitudinal growth of the seedlings be manipulated by plant growth regulators ? 8
 - (c) Alpha – Beta – Gamma biodiversity and its relation with different spatial scales of ecosystem 8
 - (d) IUCN's classification scheme for the conservation status of species 8
 - (e) Types of intellectual property rights and justify the role of a particular IPR in biological resources accessibility 8
- Q6.**
- (a) How is phytochrome associated with flowering ? 10
 - (b) How do photoperiodic response and photoinductive cycles influence flowering ? 10
 - (c) Give a detailed account of 'Fire' as an ecological factor controlling structural and functional integrity of an ecosystem. How does it affect carbon and energy balances in tropical forests ? 10+10=20
- Q7.**
- (a) Describe the role of cytochromes in electron transport chain during photosynthesis. 10
 - (b) Write an account on photolysis of water during photochemical reaction. 10
 - (c) What is meant by biodiversity conservation ? Discuss the methods of *ex-situ* and *in-situ* conservations. 5+15=20
- Q8.**
- (a) What are the most important criteria to classify if an element of nutrient belongs to 'gaseous' or 'sedimentary' cycle ? Draw the global sulphur cycle. 5+5=10
 - (b) Write an account on nitrate reductase and factors regulating its activity. How is ammonium assimilated into various metabolites ? 10+10=20
 - (c) Define leaf senescence. Describe the important biochemical and physiological changes during this process. 2+4+4=10

