

**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.*

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## SECTION A

- Q1. Write short notes on the following :** **8×5=40**
- (a) Membrane lipids 8
  - (b) Cyclins and cyclin-dependent kinases 8
  - (c) Homologous recombination 8
  - (d) Characteristics of cytoplasmic inheritance 8
  - (e) Usage of backcrossing in plant breeding 8
- Q2.**
- (a) What is the basic structure of G-protein-coupled receptors ? Where are they located in the cell ? Explain their mechanism of action and functions. 20
  - (b) Explain the sex-linked pattern of inheritance with an example. 10
  - (c)
    - (i) Explain how the hybrid plants express heterosis. 5
    - (ii) State the role of apomixis in crop plant improvement. 5
- Q3.**
- (a) Explain the process of regulation of *lac* operon in *E. coli*. 20
  - (b) “Peroxisomes play a key role in the oxidation of biomolecules.” Elaborate the statement. 10
  - (c) Give a critical account of the role of molecular markers in plant breeding. 10
- Q4.**
- (a) What are lampbrush chromosomes ? Draw a diagram and describe their structure. Are lampbrush chromosomes significant ? Explain. 5+10+5=20
  - (b) Explain the important features of a genetic code. 10
  - (c) State the conditions to apply the Poisson probability distribution. Add a brief note on the importance of binomial distribution. 5+5=10

## SECTION B

- Q5. Write short notes on the following :** **8×5=40**
- (a) Phytochromes and their role in gene expression 8
  - (b) Micronutrients essential for plant growth and their uptake mechanism 8
  - (c) Processes of phytoremediation 8
  - (d) Major consequences of global warming 8
  - (e) Student's 't'-test 8
- Q6.** (a) How is ATP synthesized in plants ? Discuss the role of ATP in photosynthesis. 10+10=20
- (b) Give a comparative account of Hydrosere and Xerosere. 10
  - (c) Explain with an example how coefficient of variation helps to compare the dispersion of two different characters in the same population. 10
- Q7.** (a) Describe the different hypotheses of endemism. Mention the criteria for identifying biodiversity hotspots. 15+5=20
- (b) "Complete oxidation of pyruvate to CO<sub>2</sub> and water occurs through a series of reactions." What are these reactions collectively called ?  
Draw the cycle with the names of the intermediates and the enzymes. 10
  - (c) Describe *Agrobacterium tumefaciens* mediated gene transfer technique in plants. 10
- Q8.** (a) What is fruit ripening ?  
Briefly discuss the biochemical and physiological changes during this process. Add a note on molecular mechanism of fruit ripening. 20
- (b) Give an idea of different categories of Intellectual Property Rights (IPR). Add a brief note on the application of IPR in protecting issues related to biodiversity conservation and traditional knowledge. 5+5=10
  - (c) How do auxins control the growth of axillary buds ? Explain.  
Add a note on the applications of auxins in agriculture. 5+5=10

