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) 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_2 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*