

CSM—9/24
PART—II/PAPER—VII
AGRICULTURE
PAPER—II

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Time : 3 Hours

Full Marks : 250

The question paper contains 18 (Eighteen) questions in GROUP—A, (12) and GROUP—B, (06) together.

GROUP—A

Candidates to attempt 10 (ten) questions within word limit of 250.

Each question carries 15 marks.

1. Define plant biotechnology. Depict the scope and importance of biotechnology in crop improvement. Also discuss molecular markers and marker-assisted selection for quality improvement.
 2. Discuss the concept of linkage and crossing over with suitable diagram. How is linkage different from crossing over? Also discuss the significance of linkage and crossing over in genetics and plant breeding.
 3. Explain the Calvin cycle in detail, highlighting the role of RuBisCO, the significance of RuBP regeneration and the importance of ATP and NADPH in the process. How does this cycle contribute to glucose formation?
 4. How do the public and private sectors contribute to seed production in India and what are the key challenges and policy considerations in balancing their roles for sustainable agricultural growth?
- ✕ What do you understand by recurrent selection? Discuss 'ear-to-row selection' and 'half-sib reciprocal recurrent selection' in improvement of a cross-pollinated crop.

6. Describe the structural organization of a eukaryotic gene, including promoters, exons, introns and regulatory elements. How do these components contribute to gene expression?
7. What do you understand by seed and seed technology? Explain different kinds of seeds produced in India. Also discuss the quality seed production and processing system in cross-pollinated crops.
8. Discuss different 'laws of heredity' taking suitable examples. Also discuss the significance of Mendelian laws in creation of genetic variability with pertinent examples.
9. Define and discuss different types of male sterility systems with suitable diagrams. Depict the procedure of hybrid seed production using cytoplasmic genetic male sterility.
10. Explain the molecular mechanism of photoperiodism in plants. How do phytochromes and cryptochromes regulate the flowering response in short-day and long-day plants?
11. Explain the roles of root pressure, capillary action and transpiration pull in the translocation of water in plants and discuss how these mechanisms are influenced by external and internal factors.
12. Explain cell theory and discuss mitotic and meiotic cell division with suitable diagrams. Also discuss the significance of cell division.

GROUP-B

Candidates to attempt 05 (five) questions within word limit of 300.

Each question carries 20 marks.

13. Over the past two decades, food production and consumption trends in India have undergone significant changes due to economic growth, urbanization, technological advancements and policy reforms. Discuss.

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14. Discuss the various methods of preservation of important fruit and vegetable products. Explain the key processing techniques and the equipments used in modern food preservation.

15. Explain the nature and classification of microbial toxins. How do these toxins affect human health, agriculture and food safety? Discuss the strategies for detection, prevention and control of microbial toxin contamination in food and agricultural products.

16. How do dryland horticulture and high-tech horticulture contribute to sustainable agriculture in India and what are the key challenges associated with their adoption?

17. What are the major handling and marketing problems faced in the fruit and vegetable supply chain and how can they be addressed?

18. Discuss the principles of epidemiology in the context of plant diseases and pest outbreaks. How do ecological, climatic and host factors influence disease progression? Critically analyze modern forecasting techniques used for predicting pest and disease epidemics in agriculture and their role in Integrated Disease Management (IDM).

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