

## BOTANY

69

## PAPER—II

Time Allowed : Three hours

Maximum Marks : 300

*The figures in the margin indicate full marks for the questions*

Candidates should answer Question Nos. **1** and **5** which are compulsory and other **three** of the remaining questions, selecting at least **one** from each Section

*Answer must be written in ENGLISH only*

*Neat sketches may be drawn, wherever required*

## SECTION—A

1. Answer any *three* of the following in not more than 250 words each :  $20 \times 3 = 60$

- (a) Explain elaborately how the linkage and cross-over data can be utilized for construction of a chromosome map.
- (b) What is cell cycle? Discuss the molecular mechanism that controls the various steps of cell cycle.
- (c) Explain with proper example how the pattern of sex-linked inheritance of a character differs from that of a normal Mendelian inheritance.
- (d) Give an account of the cytoplasmic-genetic basis of male sterility in plants.
- (e) Discuss the structural and functional details of ribosome.

2. Write critical notes on the following :

$12 \times 5 = 60$

- (a) Synaptonemal complex
- (b) Chi-square test
- (c) Special types of chromosomes
- (d) Genetic code
- (e) Geological evidences of organic evolution

3. Answer the following :

15×4=60

- (a) Differentiate between —
  - (i) pleiotropic-gene action and multiple-gene action;
  - (ii) pure-line selection and mass selection;
  - (iii) B-DNA and Z-DNA.
- (b) Deduce the experimental evidence in support of semiconservative mode of replication of DNA molecule.
- (c) Explain the genetical basis of heterosis in crop plants.
- (d) Discuss with examples how the back-cross method of breeding can be used for the improvement of crop plants.

4. Answer the following :

12×5=60

- (a) Explain the mechanism of action of physical mutagens.
- (b) Discuss the various steps involved in DNA-recombinant technology.
- (c) Explain the cytological evidence in support of crossing-over.
- (d) Define translocation. Discuss the behavioural pattern of meiotic chromosomes in a translocation heterozygote.
- (e) Discuss the physical and chemical organization of plant cell wall.

SECTION—B

5. Answer any *three* of the following in not more than 250 words each : 20×3=60

- (a) Give an account of the cyclic and non-cyclic photophosphorylation in plants. Give schematic diagrams and chemical reactions wherever necessary.
- (b) Discuss the various ecological factors that govern the distribution of plants.
- (c) Classify enzymes. Discuss the theories pertaining to the mechanism of action of enzymes.
- (d) What are the different ecosystems prevailing on the earth? Explain fully each of them citing examples.
- (e) Discuss the mechanism of passive absorption and active transport of nutrients in plants.

6. Answer the following questions :

15×4=60

- (a) Explain sequentially the chemical reactions and energy flow involved during the tricarboxylic acid cycle.
- (b) What do you mean by seed dormancy? Explain the various methods adopted for breaking dormancy in seeds.
- (c) How do you differentiate among rare, threatened and endangered plants? Discuss the different factors responsible for endemism in plants.
- (d) What is water potential? Explain how this phenomenon helps the movement of water in plants.

7. Answer the following :

12×5=60

- (a) Give an account of the Dixon's theory of ascent of sap, mentioning its merits and demerits.
- (b) Give an account of the process by which the plants convert the atmospheric nitrogen into their usable forms.
- (c) Discuss the importance of the following elements in plant life :
  - (i) Boron
  - (ii) Manganese
  - (iii) Sulphur
- (d) Describe the pathway through which the carbohydrates undergo breakdown for the formation of pyruvate.
- (e) What are the secondary plant products? Give an account of their chemical nature and importance.

8. Write notes on the following :

12×5=60

- (a) Chemosynthesis
- (b) Global warming
- (c) Electron-transport chain
- (d) Senescence
- (e) Auxins and their importance

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