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(Held in 2023)

BOTANY

Paper : BOTHC3076

(Genetics)

Full Marks : 60

Pass Marks : 24

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Choose the correct answer from the following : 1×5=5

    (a) Two allelic genes are situated on

    (i) any two chromosomes

    (ii) two non-homologous chromosomes

    (iii) two homologous chromosomes

    (iv) same chromosomes

    (b) Chromosomal theory of inheritance was proposed by

    (i) Sutton in 1902

    (ii) Boveri in 1902

    (iii) Correns in 1909

    (iv) Sutton and Boveri in 1902

(Turn Over)

(c) Which of the following is not a type of chromosomal mutation?

(i) Duplication

(ii) Inversion

(iii) Deletion

(iv) Frame shift

(d) The substitution of a purine base with a pyrimidine base is known as

(i) deletion

(ii) transition

(iii) addition

(iv) transversion

(e) $9 : 7$ ratio in F_2 generation represents

(i) incomplete dominance

(ii) co-dominance

(iii) epistasis

(iv) All of the above

2. Answer the following questions : $\qquad$ 2×5=10

(a) Differentiate between incomplete dominance and codominance.

(b) What do you mean by polygenic inheritance? Give examples of polygenic traits in plant.

(Continued)

(c) Linkage and crossing-over of gene are alternative to each other. Justify with the help of an example.

(d) Write different types of mutation. Give two examples of chemical mutagen.

(e) Differentiate between autopolyploidy and allopolyploidy.

3. Answer any *five* of the following questions : $\qquad$ 5×5=25

(a) Define transposable element. Write the mechanism of DNA repair process in plant.

(b) What is extranuclear inheritance? Explain the plastid inheritance pattern in *Mirabilis jalapa* plant.

(c) Write a note on numerical chromosomal abberation.

(d) What is complementary gene interaction? Explain Bateson and Punnett experiment on sweet pea plant regarding complementary gene interaction. Give their phenotypic and genotypic ratio.

(e) Write the types of DNA. Write and draw the Watson and Crick DNA model diagram with their characteristic.

(Turn Over)

(f) Define genetic drift. Write a concise note on genetic variation.

(g) Write the principle of Hardy-Weinberg law. Which of essential conditions is required for a population to be in the Hardy-Weinberg equilibrium?

4. Answer any *two* of the following questions :

$10 \times 2 = 20$

(a) What is gene interaction? Explain any two different types of non-allelic gene interactions with suitable examples.

$2+4+4=10$

(b) What are maternal effect and their causes? Discuss the maternal effect on shell coiling in snail with proper suitable diagram.

$2+2+6=10$

(c) What is mutagen? Write different types of mutagens in detail and explain the mutation detection technique in plant.

$2+4+4=10$

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