2016

BOTANY

(Major)

Paper : 5·3

(Cytogenetics, Plant Breeding and Biometrics)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Choose and write the correct answer : 1×7=7

(a) Heterosis is

(i) appearance of spontaneous mutations

(ii) mixture of two or more traits

(iii) induction of mutations

(iv) superiority of hybrids over their parents

(b) The testcross ratio in complementary gene action is

(i) 3 : 1

(ii) 1 : 3

(iii) 1 : 2 : 1

(iv) 2 : 1 : 1

(c) Pure line breed refers to

(i) heterozygosity only

(ii) homozygosity only

(iii) homozygosity and self-assortment

(iv) heterozygosity and linkage

(d) Multiple effects of a single gene are known as

(i) polyploidy

(ii) heteroploidy

(iii) pleiotropy

(iv) None of the above

(e) Which of the following is not a mean of central tendency?

(i) Mean

(ii) Mode

(iii) Range

(iv) Median

(f) The ratio often referred to the Mendelian ratio is

(i) 1 : 3 : 3 : 1

(ii) 9 : 7

(iii) 1 : 3 : 1

(iv) 3 : 1

(g) The genotype of an individual with Turner syndrome is

(i) YO

(ii) XXY

(iii) XYY

(iv) XO

2. Answer the following questions : 2×4=8

(a) Define inbreeding depression.

(b) What do you mean by three-point test-cross?

(c) What is chi-square test?

(d) Mention the evolutionary significance of polyploidy.

3. Answer any *three* of the following questions : 5×3=15

(a) What are gene interactions? State the three main types of gene interaction.

(b) Briefly explain the applications of heterosis in plant breeding.

(c) Describe the Mendel's dihybrid experiments with suitable example.

(d) Write on the significance of crossing-over.

4. *(a)* Explain the Hardy-Weinberg equilibrium theory with example. 10

Or

Define standard deviation with mathematical formula. Also mention its importance in plant breeding. 10

(b) Define sex chromosomes. What are the differential and non-differential regions of XY-chromosome? Describe the genic balance theory of sex determination in *Drosophila.* 2+3+5=10

Or

Define crossing-over. How does it differ from chiasma? Describe in detail the cytological basis of crossing-over with a suitable example. 2+2+6=10

(c) Explain the mode of action of physical mutagens. State the application of mutations in plant breeding. 5+5=10

Or

What is chromosome inversion? Explain different types of chromosomal inversion with schematic diagrams. Write the significance of inversion. 2+6+2=10

★ ★ ★