

2025

ZOOLOGY — HONOURS

Paper : DSCC-3

(Genetics)

Full Marks : 75

*The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.*Answer question nos. 1 and 2, and *any four* questions from the rest.

Section - A

1. Answer *any ten* questions :

2×10

- (a) What is polytene chromosome in *Drosophila melanogaster*?
- (b) What does CLB stand for in the CLB method?
- (c) What is polygenic inheritance? Give one example.
- (d) What is a linkage group? How many linkage groups are present in *Drosophila melanogaster*?
- (e) Distinguish between Monosomy and Nullisomy.
- (f) Differentiate between euchromatin and heterochromatin.
- (g) What is broad sense heritability?
- (h) What is a pseudoallele? Give example.
- (i) Distinguish between euploidy and aneuploidy.
- (j) What is complementation? Give one example.
- (k) What is haplodominance? Give example.
- (l) What is chromocentre?
- (m) Define extra-chromosomal inheritance with example.
- (n) Define prototroph and auxotroph in *Neurospora* sp.
- (o) What are Alu elements?

2. Write short notes on (*any three*) :

5×3

- (a) Lampbrush chromosomes
- (b) Chromosomal duplication and its types
- (c) P-element in *Drosophila melanogaster*.
- (d) Klinefelter Syndrome
- (e) Kappa particle in *Paramoecium*.

Please Turn Over

(4797)

3. (a) Outline the steps involved in human karyotyping.
 (b) What is idiogram? How is it related to karyotyping?
 (c) Write a short note on Barr body. 4+(2+1)+3
4. (a) Mention the phenotypic and genotypic presentation of human ABO blood group system.
 (b) Write a note on isoalleles, explaining white eye mutations in *Drosophila*.
 (c) State the significance of cis-trans test in determining allelism. 4+3+3
5. (a) Distinguish between
 (i) Terminal and intercalary deletion.
 (ii) Paracentric and pericentric inversion.
 (b) Describe the molecular basis of mutations induced by UV radiation and any one chemical mutagens. (2+2)+(3+3)
6. (a) Explain the attached-X chromosome technique for detecting mutations in *Drosophila* with a suitable diagram.
 (b) Explain incomplete linkage with a suitable example. 5+5
7. (a) Explain the Holliday model of genetic recombination with suitable diagram.
 (b) Briefly explain the inheritance pattern of haemophilia in humans including hypothetical pedigree analysis. 5+5
8. (a) Give the characteristic features of $A_c - D_s$ elements. Mention two evolutionary significance of *transposable elements*.
 (b) Distinguish between transposon and retrotransposon.
 (c) Explain different types of chromosomal translocations. (3+2)+2+3
9. In *Drosophila melanogaster*, three linked genes **A**, **B**, and **C** are located on the same chromosome. A heterozygous female with genotype **ABC/abc** is test-crossed with a homozygous recessive male : **abc/abc**. The following progeny were obtained.

Phenotype	Number
ABC	360
abc	340
Abc	40
aBC	38
ABc	12
abC	10
AbC	100
aBc	100
Total	1000

(3)

D(3rd Sm.)-Zoology-H/DSCC-3/CCF

- (a) Identify the parental classes.
- (b) Determine the order of genes on the chromosome.
- (c) Calculate the map distance between A and B & B and C loci.
- (d) Draw the linkage map.

2+2+4+2
