3 (Sem–5/CBCS) ZOO HC 2

2025

ZOOLOGY

(Honours Core)

Paper : ZOO–HC–5026

(Principles of Genetics)

Full Marks : 60

Time : Three hours

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

1. Fill in the blanks : ***(any seven)*** 1×7=7

   (a) The enzyme responsible for transposition is the _____.

   (b) Aneuploidy is produced by _____.

   (c) _____ in Drosophila is a classical example of duplication.

(d) In humans, sex of an individual is determined by the presence or absence of the _____ chromosome.

(e) SRY gene is located on _____ chromosome.

(f) Genic balance theory was proposed by _____.

(g) The term 'mutation' was coined by _____.

(h) Crossing over take place in _____ stage of meiosis.

(i) ABO system in human is controlled by _____ alleles.

(j) The unit of measurement for genetic linkage is _____.

(k) The term 'gene' is coined by _____.

(l) _____ is called "Father of Modern Genetics".

2. Answer the following briefly : ***(any four)*** 2×4=8

(a) Explain Lyon hypothesis.

(b) Give *four* examples of trisomy in human beings.

(c) What is cri-du-chat? How does it occur?

(d) What are sex-limited genes?

(e) What is tautomerization?

(f) Why is extra-chromosomal inheritance maternal?

(g) Name the factors that affect the strength of linkage.

(h) Write down the salient features of multiple allele.

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

(a) What are Ac-Ds elements ? Explain with suitable examples.

(b) How does recombination occur in phage virus ? Describe it with suitable example.

(c) What is polygenic inheritance ? Explain with an example.

(d) Mention the characteristics of extra-chromosomal inheritance. Explain the role of mitochondrial DNA on inheritance. 3+2=5

(e) What is a mutagen ? How do they cause mutation ? Give example. 1+3+1=5

(f) Distinguish between interference and coincidence. 2½+2½=5

(g) Define inversion. Explain different types of inversion and mention *one* genetic consequence of inversion. 1+3+1=5

(h) Differentiate between back cross and test cross with suitable example. 2½+2½=5

4. Answer ***any three*** : 10×3=30

(a) What are transposons ? How retrotranspons move in the genome ? Name some important eukaryotic transposons. 3+6+1=10

(b) What is F-factor ? What is its role in conjugation in bacteria ? What is HFR ? 2+6+2=10

(c) What is sex-linked inheritance ? Explain the phenomenon by giving the examples of colour blindness and Haemophilia. 2+4+4=10

(d) Define translocation. Give its different types. Describe the cytogenetics of a reciprocal translocation with the help of suitable diagram. 1+3+6=10

(e) In which cellular process the synaptonemal complex is formed ? Illustrate the structure of a synaptonemal complex and write its significance. 1+6+3=10

(f) Write the chromosome theory of Linkage. Describe Morgan's experiment on Drosophila to illustrate complete and incomplete types of linkage. 2+4+4=10

(g) Define Epistasis. Explain *any two* of the gene interaction with the help of a suitable example. 2+4+4=10

(h) Explain the law of independent assortment with a suitable illustration. Describe the results obtained from a test cross of a hybrid F_1. 8+2=10
