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63(FY) SEM-4/MAJ/ZOOMAJ2044

2025

ZOOLOGY

(Major)

Paper : ZOOMAJ2044

(Principles of Genetics)

Full Marks : 50

Pass Marks : 20

Time : Two hours



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

1. Choose the correct answer : **(all compulsory)**

1×5=5

(a) Phenyl-Ketonuria develops due to the presence of —

- (i) Lethal gene
- (ii) Pleiotropic gene
- (iii) Epistatic gene
- (iv) Polygene

(b) CLB (Cobalt-Linked Biotinylation) method is used for —

- (i) Chromosomal mapping
- (ii) Sex determination
- (iii) Sex linked gene
- (iv) Detection of mutation

(c) Which of the following is a chemical mutagen?

- (i) Ethidium bromide
- (ii) Colchicine
- (iii) DDT
- (iv) Methanol

(d) In bacterial conjugation the F⁺ cell —

- (i) acts as a recipient
- (ii) undergoes transduction
- (iii) transfers the F-element
- (iv) help transformation of cell

(e) Transposable elements are responsible for —

- (i) Replication of DNA
- (ii) Gene transfer
- (iii) Crossing over
- (iv) Linkage

2. Answer the following questions : **(any five)**
2×5=10

- (a) What is incomplete dominance?
- (b) Differentiate between interference and coincidence.
- (c) What is Criss-cross inheritance?
- (d) How polyploidy occurs in organisms?
- (e) What are lethal alleles?
- (f) What is recombination frequency?
- (g) What is the significance of complementation test in bacteria?

3. Answer the following questions : **(any five)**
5×5=25

- (a) How does the attached X-method help in detecting mutations? Explain the mechanisms.
- (b) Explain the process of bacterial recombination through transformation.

- (c) Describe the inheritance of human blood group showing the influence of multiple alleles.
- (d) Write about the transposons in bacteria and its types. $3+2=5$
- (e) Explain with example how the effect of pleiotropy and polygenic inheritance contrast each other.
- (f) Explain the chromosomal mechanism of sex determination in man.
- (g) Write the features of extrachromosomal inheritance in reference to mitochondrial mutations in saccharomyces.
- (h) Discuss sex linked inheritance in man in reference to colour blindness.

4. Answer the following questions : **(any one)**
 $10 \times 1 = 10$

- (a) What is gene mutation? Describe the molecular basis of mutations in relation to UV light and chemical mutagens with suitable diagrams. $2+4+4=10$
- (b) What do you understand by chromosome mapping? How these maps are constructed? Discuss the significance of chromosome mapping. $2+6+2=10$