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ZOOLOGY

( Major )

Paper : 4.2

Full Marks : 60

Time : 2½ hours

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

1. Answer the following : 1×7=7
- (a) What is the phenotypic ratio of test-cross progeny?
  - (b) Name the phenomenon in which one gene affects the expression of another gene.
  - (c) Linkage intensity between two genes is inversely related to the distance between them in the chromosome. Write true or false.
  - (d) What genetic condition to human autosome-21 is associated with Down syndrome?
  - (e) What are tautomers?
  - (f) Which amino acid is coded by the genetic codons AUG and GUG?
  - (g) What is ideogram?

2. Give brief answer to the following :  $2 \times 4 = 8$

- (a) Explain why the himalayan rabbits with allele  $c^h$  have coloured fur at the extremities of their bodies.
- (b) What is a map unit in linkage map? What is its other name?
- (c) Write the differences between B-DNA and Z-DNA.
- (d) What is transduction? Who first described this phenomenon?

3. Answer any three of the following :  $5 \times 3 = 15$

- (a) Write how base substitution, base addition and base deletion cause mutation in gene level.
- (b) Name the genes related with phenylketonuria and alpeptonuria, and write the symptoms of these diseases.
- (c) Define polyploidy. Name the different kinds of polyploidy. Mention at least three detectable effects of polyploidy in organisms.
- (d) Write about the structure and significance of mitochondrial DNA.
- (e) Explain the operon model of gene regulation using lac operon of *E. coli* as an example.



4. Answer any *three* from the following questions : 10×3=30

(a) In which stage of meiosis synapsis takes place? Explain the structure of synaptonemal complex and mention its role in crossing-over. 1+6+3=10

(b) Explain with example, the genic balance concept of sex determination. 10

(c) What is inversion? Write about various types of inversion. Discuss the consequences of crossing-over within inversion loop. 1+6+3=10

(d) Explain the mechanism of semi-conservative type of DNA replication and add a note on the regulation of this replication process. 7+3=10

(e) Describe various steps of transcription process in protein synthesis in prokaryotes. What is TATA box? 8+2=10

(f) Enumerate the major cytogenetic effects of ionizing and non-ionizing radiations. 5+5=10

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