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This question paper contains **4+1** printed pages]

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **7517**

Unique Paper Code : **32231502** **J**

Name of the Paper : **Principles of Genetics**

Name of the Course : **B.Sc. (Hons.) Zoology**

Semester : **V**

Duration : **3 Hours** Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt *five* questions in all, including Q. No. **1** which is compulsory.

1. (A) Define : 1×5=5

(*i*) Phenocopy

(*ii*) Transgressive variation

(*iii*) Three factor cross

(*iv*) Frame shift mutation

(*v*) Episome.

(B) Distinguish between : 2×3=6

(*i*) Intersex and Gynandromorph

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(*ii*) Sex limited and Sex influenced traits

(*iii*) Intragenic and intergenic recombination.

(C) Expand the following : 1×4=4

(*i*) PAR

(*ii*) SINEs

(*iii*) XIC

(*iv*) ClB.

(D) Explain the following : 2×2=4

(*i*) In a family blood group of mother is AB and that of daughter is O.

(*ii*) In *Drosophila*, mother contributes Y chromosome and father contributes X chromosome to the male offspring.

(E) Name the scientists who gave the following concepts : 4

(*i*) Recombination frequency used as linkage map distance

(*ii*) Gene complementation

(*iii*) Polygenic inheritance

(*iv*) Mutagenicity of X rays.

(*c*) Describe the characteristic features of IS elements. 3

3. (*a*) For mapping three X linked genes in *Drosophila*, a female heterozygous for these genes was crossed with the male having dominant phenotype of these genes. Which sex of the F1 progeny would be used for construction of linkage map ? Why ? 4

(*b*) Define interference. Write the significance of – (negative), 0 (zero) and + (positive) value of interference. 4

(*c*) In a heterozygous female two linked genes A and B are arranged in Transconfiguration. The distance between two genes is 27 cM. If such a female is test crossed, write the genotype of the progeny and percentage of each type of progeny. 4

4. (*a*) Describe the genetic basis of continuous variation, with a suitable example. 6

(*b*) Explain somatic cell hybridization and its application in gene mapping. 6

5. (*a*) How does non-allelic interaction modify the Mendelian dihybrid ratio ? 6

(*b*) Describe Bridges theory of sex determination in *Drosophila*. 6

(*a*) Describe the phage λ mediated specialized transduction. 6

(*b*) Describe the experiment of Curt Stern for cytological basis of crossing over. 6

Write short notes on any *three* of the following : 3×4=12

(*a*) Retrotransposons

(*b*) Chromosomal inversion

(*c*) Sexduction

(*d*) Inheritance of antibiotic resistance in *Chlamydomonas*.

(F) (*i*) Determine the phenotypes (shell coiling pattern) of the parents and the genotypes and phenotypes of the F1 in the following crosses in *Limnaea* : 3

(*a*) Dd (female) × dd (male)

(*b*) Dd (male) × dd (female).

(*ii*) How many different types of gametes will be formed by a parent having genotype AABbccDdEe ? 1

2. (*a*) Describe molecular basis of spontaneous mutations. 6

(*b*) In complementation studies of the *r*II locus of phage T4, three different mutations were tested in each group. On the basis of the given data, predict the results of the III experiment for each group. 3

Experiment	Group A	Group B	Group C
I	$d \times e$ – lysis	$g \times b$ – no lysis	$j \times k$ – lysis
II	$d \times f$ – no lysis	$g \times$ I – no lysis	$j \times l$ – lysis
III	$e \times f$ – ?	$b \times$ I – ?	$k \times l$ – ?

P.T.O.