B.Sc. 5th Semester (Honours) Examination, 2024 (CBCS)

Subject : Zoology

Course : CC-XII

(Genetics)

Time : 2 Hours **Full Marks : 40**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Group-A

1. Answer *any five* questions of the following: 2×5=10

(a) What do you mean by nondisjunction? Mention the role of nondisjunction in chromosomal aberration.

(b) What is the role of XIST in X-chromosome inactivation of human?

(c) What is gynandromorph?

(d) Mention the cause and effect of xeroderma pigmentosum.

(e) What is Ames test? State its utility.

(f) What is the utility of CIB method in *Drosophila*?

(g) Define point mutation. Distinguish between transition and transversion.

(h) How dosage compensation in *Drosophila* is different from human?

Group-B

2. Answer *any two* questions of the following: 5×2=10

(a) Briefly discuss complete and incomplete linkage in *Drosophila* (show the crosses). Why Mendel did not encounter linkage phenomenon during his crossing experiments in Pea plants? 4+1

(b) What do you mean by numerator and denominator genes in *Drosophila*? Give one example from each. Add a note on 'SXL' gene in sex determination of *Drosophila*. 2+1+2

(c) What is maternal effect? Describe the phenomenon during the process of shell spiralling in snail. 1+4

(d) What do you mean by sex influenced and sex limited trait? 'Bald in human is a sex influenced trait'— Justify the statement with proper scientific reason. 2+3

Group-C

3. Answer *any two* questions of the following: 10×2=20

(a) Define epistasis. Mention different types of epistasis with suitable example in each. Briefly explain the molecular basis of Bombay phenotype in the light of epistasis. 1+4+5

(b) Describe reciprocal translocation with a suitable example. How do the centric fusion and fission lead to chromosomal aberration? What is iso-chromosomes? Inversions are called crossover suppressor—why? 3+3+2+2

(c) State the role of base analogue and intercalating agents in mutation. How does deamination of nitrogenous bases lead to transition and transversion? How does aflatoxin generate an apurinic site in DNA? 3+3+2+2

(d) Singed bristles (sn), cross veinless wings (cu) and vermillion eye colour (v) are due to recessive mutant alleles of three sex linked genes in *Drosophila* melanogaster. When a female heterozygous for each of the three genes was test crossed with a homozygous recessive male, the following progenies were obtained

sn cu v	—	3
cu v +	—	392
v + +	—	34
cu + +	—	61
sn cu +	—	32
sn v +	—	65
sn + +	—	410
+ + +	—	3

(i) What is the correct order of the three genes on the chromosome?

(ii) What are the genetic map distances between three genes?

(iii) Calculate the co-efficient of co-incidence.

(iv) What is the percentage of interference? 3+2+3+2
