

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. SECOND SEMESTER EXAMINATION, MAY 2025

FIRST YEAR [BATCH 2024-28]

ZOOLOGY

Paper : 2Z0OCOC1

Date : 21/05/2025

Time : 11 am – 1 pm

Full Marks : 50

1. Answer **any five** questions : [5×2]
- What is cis-configuration and trans-configuration in a genetic cross. Describe with suitable hypothetical example.
 - Define epistasis with a suitable example.
 - What is Kozak sequence?
 - What is LHON disorder?
 - Mention the difference between germline and somatic mutation.
 - What is alternative splicing?
 - Define Target Hypothesis of Induced mutation.
 - Why XXY genotype in *Drosophila* is female but in human it is male?

Answer **any four** questions : [4×10]

- What are the five assumptions or conditions that must be met for a population to be in Hardy-Weinberg Equilibrium?
 - What is somatic cell nuclear transfer? How it was used to clone dolly? [5+(2.5+2.5)]
3. From the result of a three-point cross: (5+5)
- Write the possible genotype of the individuals crossed in the parental and the F1 generations.
 - Calculate the map distance in cM units between the genes *sc*, *ec* and *cv* from the 3-point cross below.

F ₂		Genotype of maternally inherited X chromosome			Number observed
Class	Phenotype				
1	Scute, echinus, crossveinless	<i>sc</i>	<i>ec</i>	<i>cv</i>	1158
2	Wild-type	<i>sc</i> ⁺	<i>ec</i> ⁺	<i>cv</i> ⁺	1455
3	Scute	<i>sc</i>	<i>ec</i> ⁺	<i>cv</i> ⁺	163
4	Echinus, crossveinless	<i>sc</i> ⁺	<i>ec</i>	<i>cv</i>	130
5	Scute, echinus	<i>sc</i>	<i>ec</i>	<i>cv</i> ⁺	192
6	Crossveinless	<i>sc</i> ⁺	<i>ec</i> ⁺	<i>cv</i>	148
7	Scute, crossveinless	<i>sc</i>	<i>ec</i> ⁺	<i>cv</i>	1
8	Echinus	<i>sc</i> ⁺	<i>ec</i>	<i>cv</i> ⁺	1
Total:					3248

- Describe with a genetic cross how can incomplete linkage in *Drosophila* at autosomal loci be detected with reference to the experiment with black body (**b**) & vestigial wing (**vg**).
 - Explain how nondisjunction leads to Down syndrome. [5+5]
5. a) Explain 'delayed effect' with respect to shell coiling in *Lymnaea peregra*.
b) Why males are diseased in X- linked inheritance pattern?

- c) Justify your answer by a suitable genetic cross.
- d) Suppose for a biallelic locus the allele frequency of an allele is 0.8. Determine the frequency of other allele. [3+1+4+2]
6. a) Draw and describe the structure of t-RNA.
 b) Illustrate the Hershey and Chase's experiment to prove DNA as genetic material.
 c) Write a short note on the nature and distribution of histone proteins with respect to the nucleosome model.
 d) Explain the Wobble hypothesis of Crick. [2+3+3+2]
7. a) Distinguish between Copy error and replication error.
 b) Design an experiment to show the sex-linked lethal mutation detection in *Drosophila*?
 c) What do you mean by Mullers Grand Son less progeny? [3+5+2]
8. Describe the Four types of chromosomal mutation with proper diagram. [2.5×4]
9. a) What do you mean by DCC (Dosage compensation cluster).
 b) Explain briefly the MSL cluster protein which involved this process.
 c) What do you mean by nucleosome sliding in Dosage compensation? [2+5+3]

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