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[This question paper contains 6 printed pages.]

**Your Roll No.....**

**A**

**Sr. No. of Question Paper : 1689**

Unique Paper Code : 42234406

Name of the Paper : Genetics and Evolutionary Biology

Name of the Course : **B.Sc. (Prog.) Life Sciences**

Semester : IV (LOCF)

Duration : 3 Hours Maximum Marks : 75

**Instructions for Candidates**

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt Section **A** & **B** on separate sheets.



## SECTION A – GENETICS

Answer **three** questions in all.
Question No. **1** is compulsory

1. (a) Distinguish between any **three** the following : (2×3)

P.T.O.

(i) Induced mutations & Spontaneous mutations

(ii) Dominant epistasis and recessive epistasis

(iii) Aneuploidy and polyploidy

(iv) Coupling phase and repulsion phase

(v) Intersex and gynandromorph

(b) Define any four of the following : (1×4)

(i) Lethal alleles

(ii) Heterogametic sex

(iii) Holandric inheritance

(iv) Pleiotropy

(v) Interference

(c) Justify the following statements **(any two)** : (1×2)

(i) Shell coiling pattern in the Limnaea offspring is determined by the genotype of the mother.

(ii) Recombination frequency between two genes cannot exceed 50%.

(iii) The Drosophila with chromosome combination as XXY is female

(d) Name a human syndrome associated with the following : (½×4)

(i) Monosomy

(ii) Trisomy

(iii) Chromosomal Deletion

(iv) Chromosomal translocation

2. (a) What is epistasis? Name different types of epistasis and explain any two. (7)

(b) Determine the sex of the individuals for the given chromosomal arrangements in Drosophila: (5)

(i) 3X 4A

(ii) 2X 3A

(iii) 1X 3A

(iv) 2X 2A

Briefly explain the basis of sex determination.

P.T.O.

3. (a) The data obtained from a three factor test-cross is as follows :

| Genotype | Number of progenies |
|---|---|
| XYz/xyz | 475 |
| xyZ/xyz | 495 |
| XYZ/xyz | 14 |
| xyz/xyz | 16 |
| xYZ/xyz | 98 |
| Xyz/xyz | 102 |
| xYz/xyz | 144 |
| XyZ/xyz | 156 |

Based on the given data,

(i) Determine the order of gene

(ii) Draw a linkage map and calculate the map distance between the genes

(iii) Calculate the coefficient of coincidence and interference. (9)

(b) How Somatic cell genetics can be used in gene mapping in eukaryotes. (3)

4. Write short notes on following **(any three)** : (4×3)

(a) Cytoplasmic inheritance

(b) Inversion

(c) Dosage compensation

(d) Chromosomal theory of inheritance

## SECTION B – EVOLUTTONARY BIOLOGY

Attempt **three** questions in all, including Question No. **1** which is compulsory.

1. (a) Define the following (any five) : (1×5)

(i) Coprolites

(ii) Directional selection

(iii) Coacervates

(iv) Cline

(v) Ring species

(vi) Organic variation

(b) Differentiate **(any three)** : (2×3)

(i) Mold and cast

(ii) Allopatric and sympatric speciation

P.T.O.

(iii) Homology and analogy

(iv) Microevolution and Macroevolution

(c) State the contributions of the following scientists **(any two)** : (1×2)

(i) Georges Cuvier

(ii) Ernst Mayr

(iii) Miller and Urey

2. What are isolating mechanisms? Describe various isolating mechanisms with suitable examples. (12)

3. Illustrate the role of fossil records in understanding the evolution of horse. (12)

4. Write short notes on any **three** of the following : (4×3)

(a) Endosymbiotic theory

(b) Mass extinction

(c) Genetic drift

(d) Adaptive radiation

(e) Neo-Darwinism



B.SC (P) Life Science