Mode of Examination: Open Book Examination

Unique Paper Code	**: 42234406_OC**
Name of the Paper	**: Genetics & Evolutionary Biology**
Name of the Course	**: B.Sc. (P) Life Sciences (CBCS)**
Semester	**: IV**
Duration	**: 3 Hours**
Maximum Marks	**: 75**

Instructions for Students

1. Write your Roll No., Name of the paper, Unique Paper Code, Course, Semester, and Date of examination on the first page of the answer sheet.
2. Attempt **ANY FOUR** questions, **TWO EACH FROM PART A and PART B**.
3. All questions carry equal marks.

PART-A

Q1. Illustrate a cross between a dextrally coiled snail (genotype s^+s^+) contributing female gametes, with an inbred sinistral coiled snail (genotype ss). Carry the cross to the F_2 generation and represent the expected results from inbreeding of each of the F_2 snails. Explain the results. Discuss how the mode of inheritance observed in the given example is different from other non-Mendelian inheritance. **18.75**

Q2. Female *Drosophila* heterozygous for three recessive mutations e (ebony body), st (scarlet eyes) and ss (spineless bristles) were test crossed and the following progeny were obtained:

Phenotype	Number of progeny
Wild-type	134
Ebony	16
Ebony, scarlet	136
Ebony, spineless	694
Ebony, scarlet, spineless	156
Scarlet	736
Scarlet, spineless	20
Spineless	108

a) What was the genotype of the parent heterozygous females?
b) Write the genotype of all the progenies.
c) What is the order of the genes?
d) Construct the genetic map.
e) Calculate coefficient of coincidence and interference
f) Are the genes linked? Justify
g) Illustrate the cross in this experiment.

Discuss the required conditions and advantages of three-point crosses in genetic mapping.

Q3. What is the sex of individuals with genotypes XO, XXY and XXX? Explain. Describe the role of Y chromosome in sex determination in humans. How is sex determined in Drosophila? Add a note on dosage compensation in *Drosophila*. **18.75**

PART-B

Q4. Using the example of Horse phylogeny, justify the statement "Fossils present strong physical evidence in support of evolution". **18.75**

Q5. Consider two species that diverged while geographically separated. Predict what will happen if these two species are brought together and allowed to interbreed? Discuss the various isolating mechanisms. **18.75**

Q6. Describe the process of macroevolution with help of examples. Do genetic drift, gene flow and natural selection have any role in macroevolution? Explain. **18.75**