

**2022**

**Zoology**

**[P.G.]**

**(CBCS)**

**(M.Sc. Third Semester End Examination-2022)**

**PAPER-302**

*Full Marks:40*

*Time: 02 Hrs*

*The figures in the right hand margin indicate marks*

*Candidates are required to give their answers in their own words as far as practicable*

*Illustrate the answers wherever necessary*

**[Use separate answer script for each group]**

**Group-A**

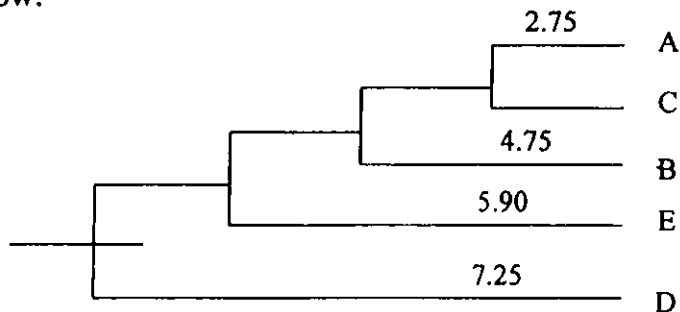
**[Molecular Evolution]**

- 1. Answer any two questions of the following:** **2x2= 4**
- a) How fitness is calculated? Give example.
  - b) The ability to taste PTC is due to a single dominant allele 'T' you sampled 215 individuals in biology, and determined that 150 could detect the bitter taste of PTC Calculate all the potential frequencies.
  - c) In which why effective population size ( $N_e$ ) can be reduced?
  - d) What is ortholog? Give example.

(2)

2. Answer any Two questions of the following: 4x2 = 8

- a) At a particular locus, there are two alleles, B and b. The mutation rate of B to b is  $3.5 \times 10^{-4}$  were as the mutation rate of b to B is  $6 \times 10^{-8}$ . What is the equilibrium frequency of the b allele, assuming no others factor in operating in this population?
- b) In a population, the frequency of + allele was 0.26 in a migrant population and 0.45 in the conglomerate population. If the migration rate was 0.1. Calculate the frequency of + in the original native population.
- c) Let us suppose that the starting allele frequencies of a population are  $A=0.5$  and  $a=0.5$  and fitness values of three genotypes AA, Aa and aa are 1.0, 0.8 and 0.2 respectively. What will be the allele frequencies of A and a after 1 generation
- d) What is UPGMA distance matrix for the gene tree shown below:



3. Answer any one question of the following: 1x8 = 8

- a) A population of 80 squirrels resides on RNLKWC (A) campus and the pregnancy of G6PD allele among them in 0.70. Another

(3)

population of squirrels is found in nearby forest and there the frequency of G6PD allele is 0.50. During rainy season, 20 squirrels from the forest migrate to campus for food and shelter, What will be the allele frequency at G6PD allele in the campus population after migration?

- b) In fruit fly two alleles are present in a locus that encodes ADH<sup>F</sup> which encodes a form of enzyme that migrate fast on electrophoretic gel (ADH<sup>F</sup>) and other form migrate slow on gele electrophoresis (ADH<sup>S</sup>). Female fruit fly with different ADH genotype produces the following number of off springs When alcohol is present

Genotype	Mean no to offsprings
Adh <sup>F</sup> / Adh <sup>F</sup>	120
Adh <sup>F</sup> / Adh <sup>S</sup>	60
Adh <sup>S</sup> / Adh <sup>S</sup>	30

Calculate the relative fitness of formals having these genotype.

**Group-B**

**[Microbiology]**

4. Answer any two questions of the following: 2x2= 4

- a) Differentiate between pili and fimbriae.
- b) Write a note on glycocalyx.
- c) What is mycorrhiza?
- d) What is the difference between Haplontic and Diplontic life cycle?

5. Answer any Two questions of the following:  $4 \times 2 = 8$

- a) What is the general process of fermentation? Name the intracellular components contributed by microbes.
- b) If a bacterial culture contained  $10^5$  cells per ml at  $t^0$  time and  $10^{10}$  cells per ml after 4 hrs, calculates its specific growth rate and doubling time.
- c) What are the difference between capsid and envelop?
- d) Discuss briefly on the outer membrane of Gram negative bacteria.

6. Answer any one question of the following:  $1 \times 8 = 8$

- a) Describe the lysogenic lifecycle of virus. Why lysogenic cycle is more beneficial to a virus than lytic cycle under certain circumstances?  $6+2$
- b) i) Describe the various methods of measuring bacterial growth.  
ii) Briefly write down the mechanism of chemotaxis in Bacteria.  $4+4$