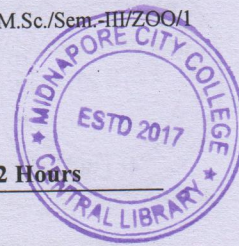


PG CBCS
M.Sc. Semester-III Examination, 2019
Paper Code: ZOO-302

Full Marks : 40

Time: 2 Hours



The figures in the margin indicate full marks.

Candidates are required to give their answer in their own words as far as practicable.

Illustrate the answers whenever necessary.

Use separate Answer Scripts for Group-A & Group-B

GROUP A

(Evolution & Adaption)

1. Answer any two questions from the following:

2×2=4

- a) Distinguish between 'directional selection' and 'stabilizing selection'.
- b) Give an example of selective advantage enjoyed by heterozygotes.
- c) What do you mean by 'bottle neck effect' ?
- d) Distinguish between silent mutation and neutral mutation with examples.

2. Answer any two questions from the following:

4×2=8

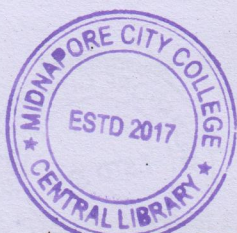
- a) A random mating rodent population contains 1 albino among 10,000 individuals. Calculate the frequencies of the alleles for black and albino body colours. Also, find out the exact number of homozygous and heterozygous blacks in this population.
- b) Describe the importance of lectin technology in distinguishing between different subspecies or strains under the same protozoan species.
- c) In E. coli, the rate of mutation from histidine independence (his^+) to histidine requirement (his^-) and the rate of reverse mutation have been estimated to be as follows:

$$his^+ \rightarrow his^- : 2 \times 10^{-6} \text{ and } his^- \rightarrow his^+ : 4 \times 10^{-8}$$

Given that no other factor is involved, determine the equilibrium frequencies of the two alleles.

- d) Two small human populations A and B have respective frequencies of phenylthio carbamide tasters (caused by a dominant allele) of 0.85 and 0.25. If 5 percent of population B comes from population A each generation, what will be the frequency of the tasting gene in population B after 1 and 2 generation ?

(P.T.O)



(2)

3. Answer any one question from the following:

1×8 = 8

a) (i) The frequency of an allele 'x' in West Bengal was 0.63 in 1970. Some people migrated to West Bengal at that time from another state where the frequency of 'x' was recorded to be 0.028. The immigrants developed marital relationship with the people of West Bengal for 2 generations. At present, the frequency of 'x' in West Bengal is found to be 0.446. Calculate the rate of gene flow to West Bengal from the other state. 4

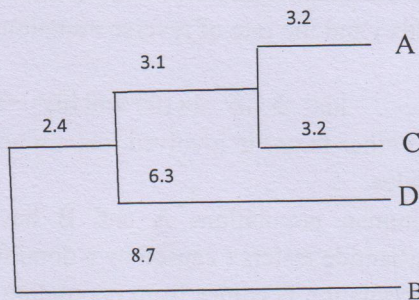
(a)(ii) Amino acid differences in respect of a hypothetical polypeptide among 4 species are shown in the distance matrix below:

	Mouse	Rat	Rabbit	Dog
Mouse		8	15	19
Rat			18	16
Rabbit				5
Dog				

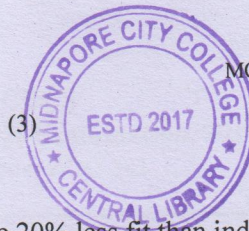
Which pair of species should you join first and how will you construct the whole gene tree? 4

b) (i) What is UPGMA? Present the UPGMA distance matrix from the gene tree given below:

1+3



(P.T.O)



(3)

- c) (ii) Individuals with genotype bb are 20% less fit than individuals with the genotypes BB or Bb . If B mutates to b at a rate of 10^{-6} per generation, what is the expected frequency of the allele b when the population reaches mutation-selection equilibrium. 4

GROUP-B**(Microbiology)**

4. Answer any two questions from the following:

2×2=4

- What is pure Culture ?
- What is selective media ? Give an example.
- State the function of capsule.
- Enlist Koch's Postulates.

5. Answer any two questions from the following:

2×4=8

- Briefly describe the steps of cheese preparation. What is an Antibiotic ? 3+1
- How can bacteria be classified on the basis of temperature requirement?
- Why do the bacteria undergo the stationary phase? What do you mean by Diauxic growth? 2+2
- Describe the quorum sensing of *Vibrio harveyi* for light emission.

6. Answer any one question from the following:

1×8=8

- (i) Draw, label, and briefly describe the ultra-structure of Gram Negative bacterial cell wall.
 - (ii) Why do the Gram Negative bacteria lose the crystal violet colour after alcohol wash in Gram staining process?
 - (iii) Write a short note on Bacterial Chemotaxis. 5+1+2
- b) (i) Why is a lysogen immune to superinfecting phage ? 4
- Distinguish between bacteriophage and eukaryotic virus.
 - Distinguish between Myoviridae, Siphoviridae, Podoviridae family bacteriophages according to the ICTV classification. 4
