2017

M.Sc.

3rd Semester Examination

ZOOLOGY

PAPER—ZOO-302

Full Marks : 40

Time : 2 Hours

The figures in the right hand-margin indicate full marks.

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

Illustrate the answers wherever necessary.

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

Group-A

(Evolution and Adaptation)

1. Answer any *two* questions of the following : 2×2

(a) A certain stock of Drosophila shows a mutation rate for normal (w^+) to cosin(w^e) of 1.3×10^{-4} and a reverse mutation rate $w^e \rightarrow w^+$ of 4.2×10^{-5}. What is the equilibrium value of w^e ?

(b) Why homologous genes have sequences that are similar but not identical ?

(c) Write the features of the methods adopted to construct phylogenetic trees from DNA or protein sequence data.

(d) Enlist the types of molecules having antioxident properties.

2. Answer any *two* questions of the following : 2×4

(a) ABO blood group frequencies of the Dunkers, a religious section that originated in Germany and settled in USA. Dunkers has remained isolated from surrounding population. The frequency of ABO blood type found in Dunkers compared to surrounding Americans and German population is shown in table below. What explanation would you offer to account for the blood group frequencies among Dunkers.

	Number of Persons Tested	*Blood group frequencies*			
		A	AB	B	O
Dunkers	228	0.593	0.02	0.03	0.35
German	5036	0.44	0.04	0.10	0.40
American	30000	0.39	0.04	0.11	0.45

(b) Huntington's Chorea (Caused by a dominant gene) has a mutation rate about 1×10^{-6}. Assuming that equilibrium has been reached, what is the selection

coefficient against this game ? What are the equilibrium frequencies of recessive gane with the same selection coefficient as Huntington's Chorea and having the same mutation rate.

(c) Define ROS. How are they formed within human body. State their deleterious effects. 1+1+2

(d) What are the different levels of adaptation manifested by living beings ? Illustrate two systems of stress response. 2+2

3. Answer any *one* of the following : 1×8

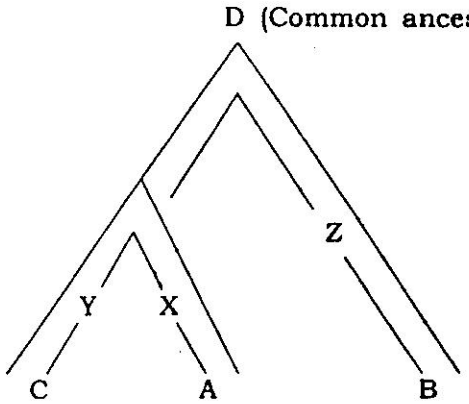
(a) Construct a molecular phylogenetic tree using the tabe provided below.

Number of dissimilar amino acids in the α-globin of representation vertebrates among 141 amino acids

	Mouse	Chicken	Newt	Carp	Shark
Human	16	35	62	68	79
Mouse		39	63	68	79
Chicken			63	72	83
Newt				74	84
Carp					85

Estimate the extent to which the amino acid sequence of these six organisms differ.

(b) (i) The parsimonial mutational distance for a particular protein comarison between species A & B is 25 ; between A & C is 20 and B & C is 30.



Find out the value of X, Y and Z and coment on phylogeny.

(ii) What do you mean by oxidative stress ? 6+2

Group-B

(*Microbiology*)

4. Answer any *two* questions from the following : 2×2

(a) Why are endospores highly resistant ? State the structure of a typical Endospore.

(b) What is the purpose of Benchtop tests ?

(c) Distinguish between Growth rate and generation time.

(d) Give the names and distinguish features of the five kingdoms laid by whittaker.

5. Answer any *two* questions from the following : 2×4

(a) What is Quorum sensing ? Describe how does it occur and state its importance to micro-organisms. 1+2+1

(b) Describe the composition and structure of gram-positive and gram-negative cell walls.

(c) Classify bacteria on the basis of temperature as well as pH requirements.

(d) State the unique features of Algae as a taxa. What is the contribution of Algae in a soil environment ? 2+2

6. Answer any *one* of the following : 1×8

(a) (i) Illustrate the mechanism of Flagellar movement and relate flagellar rotation to bacterial movement.

(ii) Classify culture media on the basis of several parameters. 4+4

(b) (i) State the significance of Hopanoid molecule. Classify Fungi broadly. 1+3

(ii) Draw a diagram illustrating how gram-positive cooci might divide to produce the various clustering patterns. 4+4