2013

M.Sc. Part–II Examination

ZOOLOGY

PAPER—VII (Group—B)

Full Marks : 50

Time : 2 Hours

The figures in the margin indicate full marks.

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

Illustrate the answers wherever necessary.

Write the Answers to Questions of each Unit in separate Booklet.

Answer any *four* questions taking *two* from each unit.

Unit—I

[Microbiology]

1. (a) Schematically represent the 8-kingdom classification system. What is the basis of this system? Define the various microbial kingdoms under it. 2+2+5

(b) Explain the effect of Oxygen and CO_2 on bacterial growth separately. $2+1\frac{1}{2}$

2. (a) Compare the role of 5 different groups of microbes in soil environment. 5

(b) How would you account for the stationary phase in bacterial growth curve ? 3

(c) Draw and explain the fine structure of basal components in a bacterial cell wall. $4\frac{1}{2}$

3. (a) Classify cocci based on their plane of division Illustrate with proper figures. 5

(b) State the functions of bacterial Pili. 3

(c) Give examples of viruses multiplying only in vertebrates and bacteria. (one for each) 2

(d) What are the causes of high resistance in bacterial spores ? $2\frac{1}{2}$

4. Write short notes on any *five* of the following: $2\frac{1}{2} \times 5$

(i) Benchtop test.

(ii) Synthetic media.

(iii) H–O variation.

(iv) Difference between capsule and slime.

(v) Inclusion granules.

(vi) Vitrification.

(vii) Active immunity.

Unit—II

[Environmental Physiology and Evolution]

5. (a) A completely recessive allele of g is lethal in homozygous condition. If the dominant allele G mutates of g at a mutation rate of 10^{-6} per generation, what is the expected frequency of the lethal allele when the population reaches mutation-selection equilibrium ?

(b) In a forest habitat, assume that initially the frequency of A is p = 0.5, that the frequency of a is q = 0.5, and that s_i = 0.1. Furthermore, let's assume that population mates randomly & that the genotypes are present in HWE. Calculate the frequency of the a allele after one generation of selection. $12\frac{1}{2}$

6. (a) What is phylogenetic tree ?

Mention the differences between unrooted & rooted phylogenetic trees.

(b) The α-globin polypeptide consists of 141 amino acids. Differences of the number of amino acids are tabulated comparing the sequence of α-globin from one organism with the sequence of α-globin from another organism. Make a phylogeny tree.

Number of dissimilar amino acids in the α-globins of representative vertebrates.

	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

$(1+3)+8\frac{1}{2}$

7. (a) Describe the hormonal regulation of body temperature adjustment.

   (b) Illustrate the counter current heat exchange mechanism.

$8+4\frac{1}{2}$

8. (a) The mutational distance (from a result of protein comparison) between species A and B is 25, between A and C is 20 and between B and C is 30. Draw a phylogenetic tree from a common ancestor D and calculate the length of the tree.

   (b) Write a brief notes on BAT metabolism.

   (c) An allele $\underline{A}$ is a hot-spot of mutation and undergoes mutation to $\underline{a}$ at a frequency of 10^{-4} per generation. If the frequency of reverse mutation from a to A is 10^{-7} per generation, what is the expected equilibrium allele frequency of a?

$5+2\frac{1}{2}+5$
