2017

M.Sc. Part–II Examination

ZOOLOGY

PAPER—VII

Full Marks : 100

Time : 4 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.

Use separate Answer-scripts for each group.

Group–B

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

Unit—I

[Microbiology]

1. (a) What do you mean by 'Coliform' bacteria ?   2

   (b) Elaborate the major methods of measuring bacterial growth.   4

   (c) Distinguish between simple, synthetic and composite media. Provide examples. $1\frac{1}{2}+1\frac{1}{2}+1\frac{1}{2}$

   (d) State the different categories of bacteria based on their source of respiration.   2

2. (a) Compare the features of Archaebacteria with that of Eubacteria. 4

(b) How are microcapsules different from capsules? 2

(c) Discuss different physical conditions that affect bacterial growth. $3\frac{1}{2}$

(d) Describe the vital functions of the bacterial cell wall. 3

3. (a) Give an example each for viruses multiplying in the hosts — plants ; bacteria ; mammals. 3

(b) How can bacteria be identified depending on their modes of metabolism. Provide names of particular biochemical tests in each category. $3+1\frac{1}{2}$

(c) In which taxa are 'Alternation of Generation' observed ? 1

(d) Elaborate the location and ecological roles of various microorganisms in a soil environment with appropriate figure. 4

4. (a) Why are bacterial spores highly resistant ? Draw a labelled diagram of a typical spore. $2+1\frac{1}{2}$

(b) Describe the morphological variations observed in bacterial cells. 5

(c) Compare the efficacies of endotoxin with exotoxin. 4

Unit—II

[Environmental Physiology and Evolution]

5. (a) In a Forest assume that initially the frequency of A is 0.5(p) and q is 0.5(q). Selection pressure is 0.15. Let us assume the population mate random and the geno-types are in HWE. Calculate the frequency af a allele after one generation of selection.

(b) Individual with the 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. $6\frac{1}{2}+6$

6. (a) What is the UPGMA distance matrix for the gene tree shown below
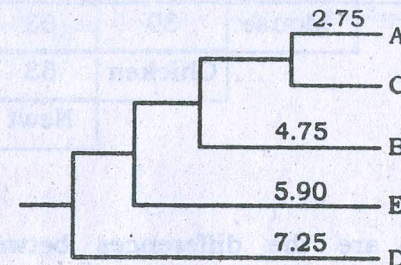
(b) What is significance of Founder effect ?

(c) What is ortholog gene ? Give example.

(d) Mention the methods by which gene tree can be made.

$6\frac{1}{2}+2+2+2$

7. (a) Illustrate the counter-current cooling exchange mechanism.

(b) What are the factors facilitating conversion of oxyhaemoglobin to deoxyhaemoglobin ?

(c) Mention the role of Antioxidant in management of oxidative stress. $7+2+3\frac{1}{2}$

8. (a) The α-globin polypeptide consist of 141 amino acids. Differences of the number of amino acids are tabulated comparing the sequences of α globin genes in different organisms. Make a phylogenetic tree.

Number of dissimilar amino acids in the α globin genes 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

(b) What are the differences between rooted and unrooted phylogenetic tree ? $8+4\frac{1}{2}$