2009

M.Sc.

1st Semester Examination

MICROBIOLOGY

PAPER—III

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.

Answer any *two* questions from each group.

Group—A

[Marks : 20]

Answer any *two* questions.

1. (a) Draw the molecular structure of water and explain why water has dipole moment? 5

(b) What is the consequence of the dipole moment of water on its :

(i) specific heat ;

(ii) heat of vaporization ;

(iii) solvent properties. 5

2. (a) Why addition of small amount of acid or base in water changes H^+ concentration drastically but the negligible change in a buffer solution ? 2

(b) The pK_a of acetic acid is 4·76.

What will be the pH of a mixture of 0·2M acetic acid and 0·02M sodium acetate ?

(i) 3·76, (ii) 4·76, (iii) 5·76, (iv) none of the above. 2

(c) A mixture of 0·4M acetic acid and 0·04M sodium acetate will have :

(i) same pH as before and same buffer capacity ;

(ii) different pH but same buffer capacity ;

(iii) same pH but higher buffer capacity ;

(iv) same pH but lower buffer capacity. 2

(d) The pH of a neutral solution is 7 at 25°C. Will it be the same at lower / higher temperatures ? Explain. 2

3. (a) Which of the following has the highest energy, and which the lowest, among the following : 2

covalent single bond

covalent double bond

hydrogen bond

(b) Give examples of these bonds in a DNA base pair. 6

(c) What is the approximate energy of a hydrogen bond ? 2

4. (a) What are the different types of molecules that constituent a plasma membrane ? How are these different molecules organized in a plasma membrane ? 5

(b) What are the various functions served by biological membrane ? 5

Group—B

[Marks : 20]

Answer any *two* questions.

5. Write short notes on : (any *four*) $2\frac{1}{2} \times 4$

(i) GC–MS ;

(ii) Protein Crystallography ;

(iii) Flow Cytometry ;

(iv) Optical Rotatory Dispersion (ORD) ;

(v) Methods of Protein Sequencing.

6. Write down the working principle of SEM and AFM. How atomic level image is formed by AFM? Write down techniques of different modes of AFM. 3+2+3+2

7. Explain with the help of flow chart the steps of analysing proteins using HPLC.

What is combined advantage of LC and MS?

Name chemical criteria of any two types of HPLC columns. 4+3+3