2010

M.Sc.

1st Semester Examination

MICROBIOLOGY

PAPER—III (MCB—103)

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) Write down the nuclear reaction for negatron emission. 2

(b) State how you determine the age of a fossil using tracer technique. 4

(c) Briefly describe the operating principle of liquid scintillation counter. 4

2. (a) What do you mean by Gibbs free energy and standard free energy change? 2+2

(b) Calculate the standard state ΔG values at (i) pH O and (ii) pH 5 for the dissociation of acetic acid : 3+3

$$CH_3COOH \rightleftharpoons CH_3COO^- + H^+ \ (pK_a = 1.75 \times 10^{-5})$$

Or

(a) What do you mean by OS mode? 1

(b) Describe how that molecular weight of a solute is determined from the osmotic pressure. 4

(c) Write down the biological application of Gibbs-Donnan effect. 5

3. (a) What do you mean by activity co-efficient? 2

(b) If pH = – log $[H^+]$ for dilute solution, explain why the pH of 10^{-7}M HCl aqueous solution is less than 7. 8

Group—B

[Marks : 20]

Answer any *two* questions.

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

(a) Gel Electrophoresis ;

(b) Preparative Ultracentrifuge ;

(c) Affinity Chromatography ;

(d) Confocal Microscope ;

(e) Visible spectroscopy.

5. (a) Draw schematic diagram of a mass spectrometer and explain its principle of operation.

(b) Write in brief on Protein Crystallography. 6+4

6. (a) When does Nuclear Magnetic Resonance occur? Explain the working of NMR spectrometer with a schematic diagram.

(b) Write on applications of Electron Microscope in Biological Sciences. 6+4

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