B. Tech.

(SEM. IV) EXAMINATION, 2006-07

ANALYTICAL METHODS IN BIOTECHNOLOGY

Time : 2 Hours] [Total Marks : 50

Note : Attempt all questions.

1. Attempt any two of the following: \(6 \times 2 = 12\)

   (a) Explain the principle and applications of gel filtration chromatography. How this technique is used for determination of molecular weights of proteins?

   (b) Describe the apparatus, sample application and separation conditions in Gas Liquid Chromatography.

   (c) Discuss the principle of partition chromatography. Describe different modes of partition chromatography that differ in the relative polarities of the stationary and mobile phases.

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2. Attempt any two of the following:  

(a) What is the origin of change on protein molecules? Discuss the methodology involved in separation of proteins by polyacrylamide gel electrophoresis.

(b) What are ampholytes? How isoelectric focussing gels are prepared? Why IEF is regarded as a highly sensitive analytical technique?

(c) Describe the electrophoretic methods for separation of DNA. How pulsed field gel electrophoresis differs from conventional agarose gel electrophoresis?

3. Attempt any four of the following:  

(a) Explain the relationship between the viscosity of a solution and shape of the solute molecules at a given solute concentration.

(b) What is Gibbs-Donnan equilibrium effect? How osmotic pressure is related to molecular weight of proteins in solution?

(c) Explain the role of Na$^+$ – K$^+$ – ATPase in transport across biological membranes.

(d) What is action potential? Explain the mechanism of propagation of impulses on membranes.

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(e) Mention the key features of some commonly used radioisotopes for biological work.

(f) Briefly describe the applications of radioisotopes in biological sciences.

4. Attempt any **four** of the following:  
   
   (a) What is Beer-Lambert’s law? Define molar absorption coefficient.

   (b) Explain salient differences between principles of ORD and CD measurements.

   (c) How ESR spectroscopy has been useful in structural characterization of metalloproteins?

   (d) Briefly describe the working principle of a transmission electron microscope.

   (e) Mention the different types of rotors used for centrifugation of biological materials.

   (f) What is ultracentrifugation? Mention its application in determination of molecular weight of macromolecules.