

**Department of Biochemical Engineering and Biotechnology  
Indian Institute of Technology Delhi**

**BEL 311: Physical and chemical properties of Biomolecules  
Major Test II Ind Semester 2006-2007**

**Marks 50  
Time 2 hours**

1. (a). A protein contains 4 disulphide bonds and no free cysteine residues. Through some controlled experiment you tried to partially reduce the disulphide linkages. How to determine the extent of reduction of disulphide bonds using UV-VIS spectroscopic method. Explain the steps involved in the process. (8)
- (b). While monitoring a chemical modification reaction of a protein molecule using IR spectroscopy, how can the extent of conversion can be assigned? Explain with an example (7)
- (c). Why the IR spectroscopic technique is advantageous over the UV-VIS spectroscopic method in monitoring Biochemical reactions. Explain(5)
2. (a). Using the intrinsic and extrinsic fluorescence spectroscopic techniques, how can you demonstrate whether the process of protein unfolding is reversible or not and whether the process involves the formation of equilibrium intermediates? 4+4=(8)
- (b). Explain the steps involved in the structure reactivity relationship study of a protein using the techniques involved and physical basis of using the experimental tools in the process. (7)
- 3.(a). Explain the basic mechanism of GroEL/GroES assisted folding of a recombinant protein. (5)
- (b) How to understand the extent of in vivo chaperone assisted and unassisted folding of a recombinant protein. (5)
- (c) How to establish the physical association of newly synthesised protein with GroEL in vivo and in vitro. (5)