CHEM 4630 – Biochemistry of Proteins **March 23, 2010**

Term Test-2

*Answer all questions in the Exam Booklets. Put your name and student number on all exam booklets. Draw **structures** and **diagrams** where appropriate.*

The total number of marks is 55 and you have 75 minutes to complete the exam.

Answer ALL questions.

(12) 1. Outline the steps involved in the solid-phase synthesis of peptides. Molecular structures are required for full marks. Be sure to show the structure of an activated amino acid and peptide bond formation. Explain the role and importance of the solid resin. You need **not** show a mechanism for deprotection.

(2) 2. Explain the term ***racemization***. What important implication does it have for peptide synthesis?

(4) 3. Explain the structural relationships between *D*-HIV Protease and *L*-HIV Protease.

(10) 4. Compare and contrast the structural features of the α-helix and 3_{10}-helix.

(7) 5. Draw and label a Ramachandran diagram and indicate the location of the left- and right-handed α-helix, parallel and anti-parallel β-sheet, and the collagen triple helix = polyproline helix.

(8) 6. Outline how X-ray diffraction **OR** NMR spectroscopy **OR** Circular Dichroism spectropolarimetry can be used to obtain structural information about proteins and what sort of structural information is obtained.

(6) 7. Explain what structural features of proline account for it being described as a helix breaker. Why is it often found in turns?

(6) 8. Draw a topology diagram showing the secondary structure in an up-and-down β -barrel and a Greek key β-barrel. For each structure name one protein that contains the structure and describe its biological function.

(6) 6. *D*-amino acid oxidases found in the livers and kidneys of animals seem to function as detoxifying agents for the removal of harmful *D*-amino acids. They catalyze the oxidative deamination of *D*-amino acids producing ammonia, hydrogen peroxide, and a keto acid. They have an absolute specificity for *D*-amino acids and will not recognize *L*-amino acid substrates. Explain what structural features of enzymes make such selectivity possible.