CHEM 4630 – Biochemistry of Proteins **March 20, 2018**

Term Test-2

*Answer **all** the 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 52 and you have 75 minutes to complete the exam.

(4) 1. A positive ion mode electrospray ionization mass spectrum of human carbonic anhydrase showed a family of peaks. Two neighbouring peaks in the family had m/z values of 1329.82 and 1393.14. What is the mass of carbonic anhydrase?
For full marks show your calculations.

(8) 2. Explain how to sequence a peptide by mass spectrometry **OR** explain the SILAC method for quantitative proteomics.

(8) 3. Give an **outline** of the steps involved in the solid-phase synthesis of peptides. Molecular structures are required for full marks. You must show the formation of a peptide bond but you need not show any other mechanisms such as amino acid activation.

(10) 4. Describe the results of a study in which synthetic *D*- and *L*-snow flea antifreeze proteins were produced.

(6) 5. What is the hydrophobic effect and what is its importance to protein folding?

(*4*) 6a. Draw and label a Ramachandran diagram and indicate the positions of right- and left-handed α-helices.

(4) 6b. Ramachandran diagrams depict the conformations of proteins using two backbone dihedral angles. Draw a peptide bond and use your diagram to explain the structural feature that makes it possible to describe the conformation of a polypeptide using two backbone dihedral bond angles only.

(8) 7. Describe the major structural features of α-helices.