Mid-Term Test

Answer all questions in the Exam Booklets. Put your name and student number on all exam booklets. You may use a calculator and diagrams where appropriate.

The total number of marks is 71 and you have 75 minutes so spend about 1 min. per mark i.e. 20 min. for a 20 mark question etc.

Answer questions 1. It is worth 6 marks.

1. Draw the peptide Lys-Leu and label <u>all</u> the dihedral angles with Greek letters or names.

Answer questions 2. It is worth 12 marks.

2. Describe in detail an α -helix and a 3_{10} helix remarking on the differences between them.

Answer 1 of questions 3 and 4. Each is worth 20 marks.

- 3. Describe in chemical detail the three main steps of an Edman degradation indicating the role and importance of pH, buffers, and organic solvents.
- 4. Outline a protocol for amino acid analysis of a protein and describe in chemical detail peptide hydrolysis by strong acid or base.

Answer question 4. It is worth 15 marks.

5. Explain the process by which a protein can be sequenced using mass spectrometry.

Answer question 5. It is worth 10 marks.

6. Describe briefly how the synthesis of a set of random peptides consisting of *D*-amino acids was used to discover a peptide that mimics the activity of an all *L*-amino acid brain peptide. What are some of the advantages of this approach to drug discovery?

Answer 1 of questions Question 7 and Question 8. Each is worth 8 marks.

- 7. A 2 micromolar solution of a protein comprising a single polypeptide chain has an absorbance in a 1 cm cuvette at 290 nm of 0.73 at pH 7 and an absorbance of 0.78 at pH 12. The molar extinction coefficient for tyrosinate at pH 12 is 2480 M⁻¹cm⁻¹. How many tyrosine residues are in this protein? What is the structure of tyrosinate?
- 8. Compare and contrast solid-phase and solution peptide synthesis.