

- 6) (3 points) Draw a Fisher projection of L-alanine.
- 7) (2 points) Why is alanine optically active, while glycine is not?
- 8) (3 points) List three amino acids whose side chains can form hydrogen bonds with water.
- 9) (3 points) List three amino acids whose side chains can participate in hydrophobic interactions.
- 10) (1 point) Which (one) amino acid allows the most flexibility when found in a protein?
- 11) (1 point) Which (one) amino acid allows the least flexibility when found in a protein?
- 12) (1 point) What do the amino acids threonine and tyrosine have in common?
- 13) (6 points) State whether each of the following amino acids is L or D.
- | | |
|----|----|
| a) | c) |
| b) | d) |

14) (9 points) Name the following amino acids. Also give their one-letter and three-letter abbreviations.

<u>Structure</u>	<u>Name</u>	1-letter	3-letter
_____	_____	—	_____
_____	_____	—	_____
_____	_____	—	_____

15) (1 point) Low levels of the neurotransmitter serotonin cause depression. The structure of serotonin is shown below. What amino acid is serotonin derived from?

16) (5 points) Mark each of the following statements about peptide bonds as true (T) or false (F).

- a) They are planar.
- b) The carbonyl oxygen and the amine hydrogen are *cis* to each other.
- c) They are formed by the condensation of two amino acids.
- d) They are important in the primary structure of proteins
- e) They can occur between polypeptides and RNA.

17) (5 points) What is the biological significance of invariant residues of homologous proteins?

18) (5 points) What constitutes a conservative substitution for an amino acid residue in a protein?

19) Use this table to answer questions (a) through (c).

Amino Acid	$pK_{NH_3^+}$	pK_{COOH}	pK_R
Aspartic Acid	9.90	1.99	3.90
Glutamic Acid	9.47	2.10	4.09
Serine	9.21	2.19	--

- a) (10 points) Draw the tripeptide Asp-Glu-Ser at pH 1, showing each amino acid in its L-configuration.
- b) (5 points) Calculate the isoelectric point for Asp-Glu-Ser. **Show your work for credit!**
- c) (5 points) Estimate the charge (in whole numbers) on the tripeptide Asp-Glu-Ser at pH 7.0.

- 20) (5 points) Which of the following amino acids would be likely to be in a protein that interacts ionically with DNA at physiological pH?
- a) Tryptophan
 - b) Aspartic acid
 - c) Glutamine
 - d) Arginine
 - e) Histidine
- 21) (10 points) What is the amino acid sequence of the polypeptide that gives the following fragments when cleaved by the chymotrypsin and V8 protease?
- a) Chymotrypsin
 - i) CN
 - ii) NLQNY
 - iii) GIVEQCCHKRSEY
 - b) *S. aureus* V8 protease
 - i) GIVE
 - ii) YNLQNYCN
 - iii) QCCHKRCSE