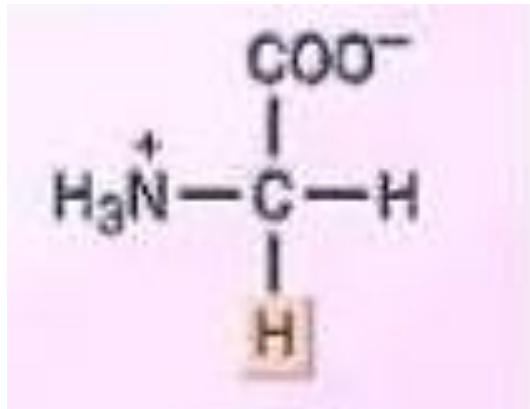


# Sample questions

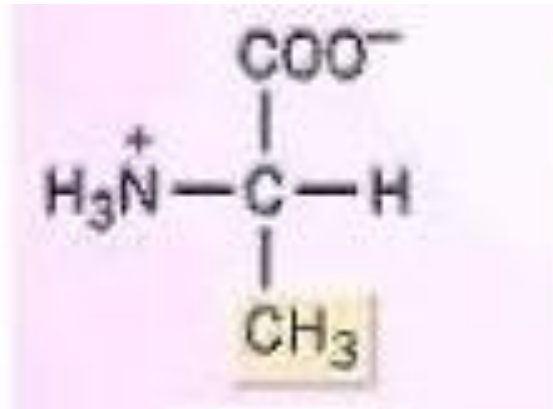
## 1. State TRUE or FALSE

- I. Quarternary structure refers to the three-dimensional arrangement of polypeptide subunits in a protein consisting of two or more polypeptide chains.
- II. The cis isomer is the highly favourable isomer for most peptide bonds except those preceding proline.
- III. Ramachandran plot is a graphical representation of the sterically allowed conformations of peptide planes

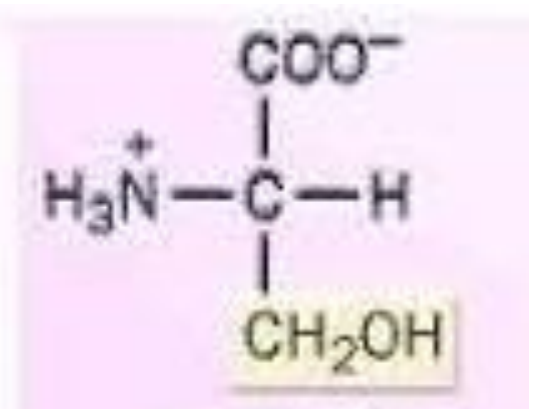
2. Below given is three amino structures. Determine which amino acid do not have chiral carbon, C-alpha? What are the names of the amino acids.



A



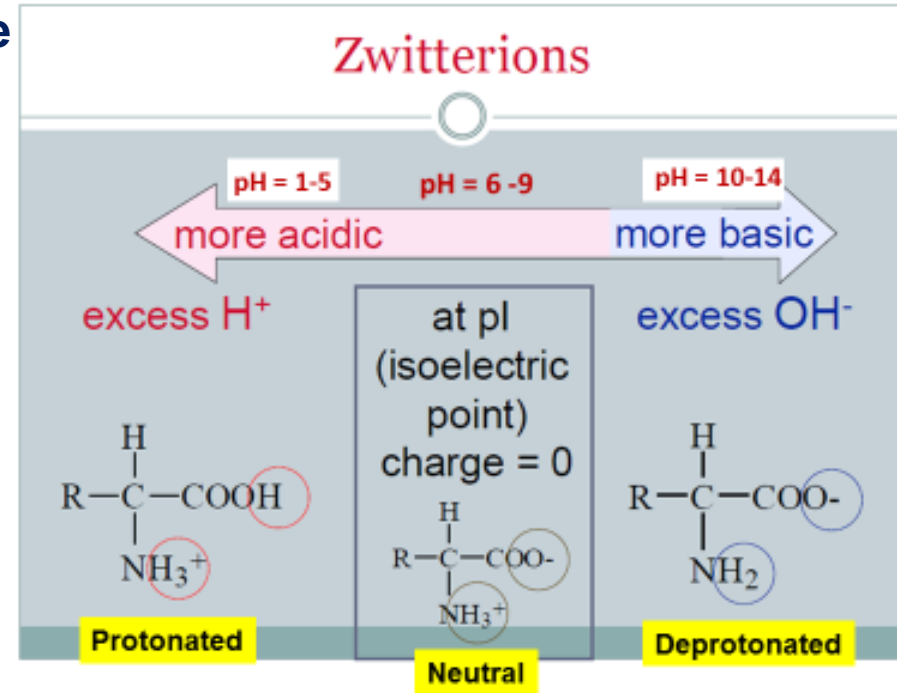
B



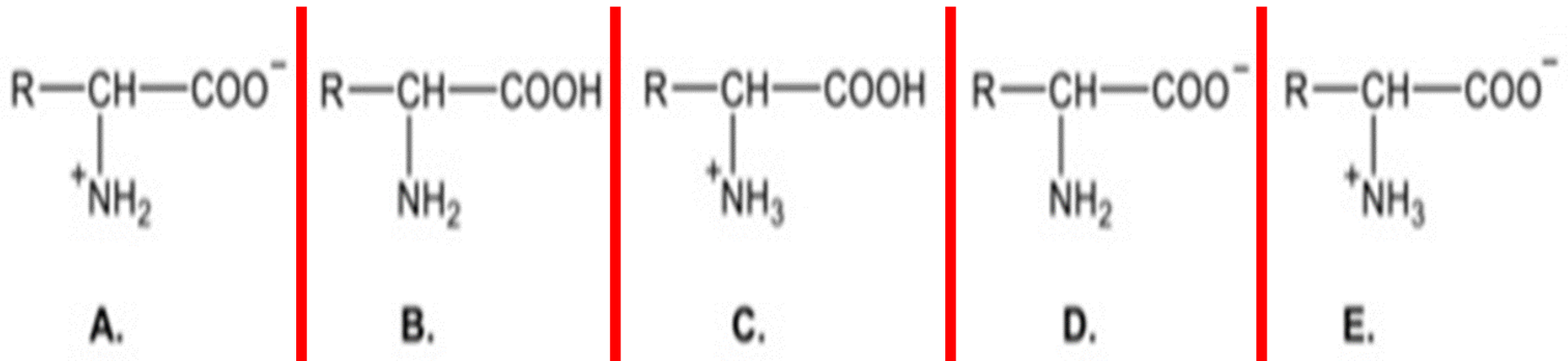
C

3. The following questions refer to the structures A-E below:

- Which is a “zwitterion”?
- Which represents the structure of an amino acid at very high pH?
- Which represents the structure of an amino acid at very low pH?
- Which structure is not possible



At cellular pH 7.4 , all amino acids exist as “Zwitterions”.



4. How many respective amino acids are present in a below given amino acid sequence?

$\text{H}_2\text{N} \dots \text{A-G-K-Y-K-F-Y-L-M-Y-T-H-K-D-H-I-C-C-E-N-A-A-Q-R} \dots \text{COOH}$

Tyrosine ?

Lysine ?

Arginine ?

Phenylalanine ?

Tryptophan ?

Glutamine ?

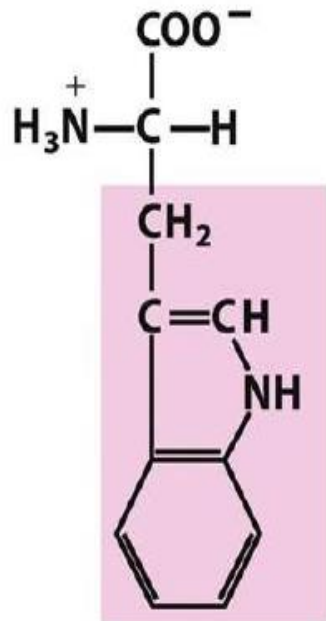
Aspartate ?

Glutamate ?

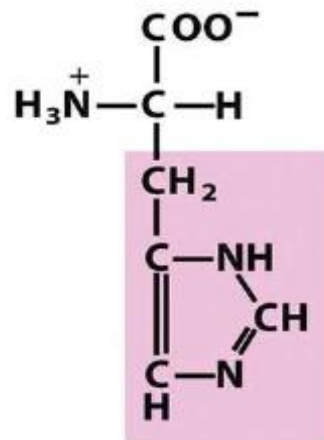
Asparagine ?

**(5) For the following five amino acids, examine their side chains and determine whether the side chain is nonpolar, acidic, or basic. Assume each amino acid is at physiological pH.**

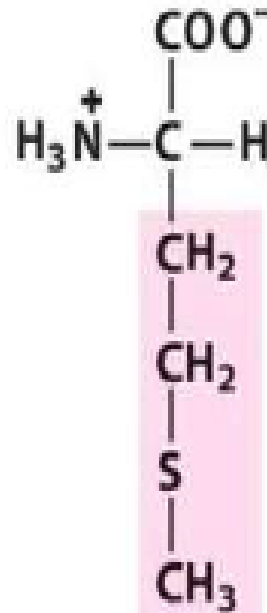
- Tryptophan
- Histidine
- Methionine
- Phenylalanine
- Glutamic acid



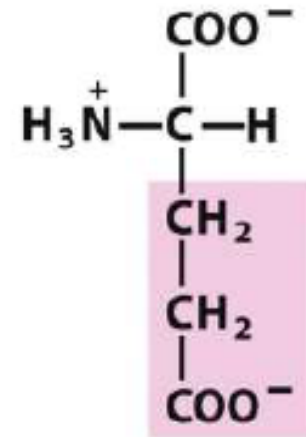
**Tryptophan**



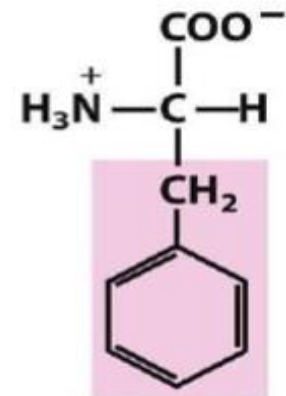
**Histidine**



**Methionine**



**Glutamate**



**Phenylalanine**

**(6) For each of the following functional groups, name at least one amino acid that has one in its structure.**

- An aromatic ring
- An alcohol
- An amide
- A phenol
- A sulfhydryl group

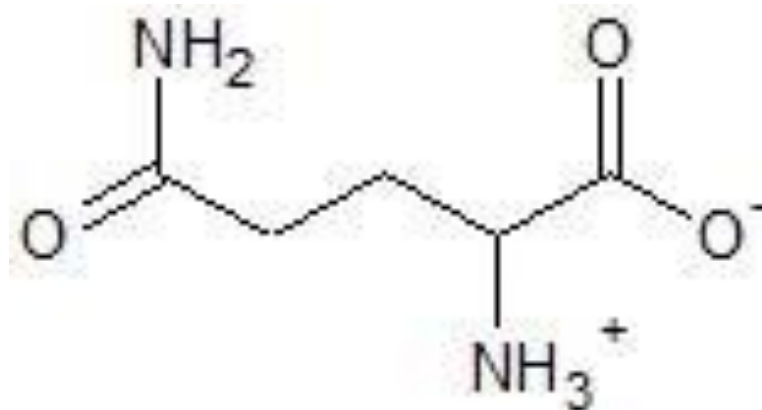
**(7) Name the four different types of interactions responsible for creating tertiary structures in proteins.**

**(8) Name at least three amino acids whose side chains have the characteristic of being able to repel water.**

**(9) Define denaturation of proteins and list five different ways to denature a protein?**

**(10) In general, proteins can be classified into 3 different groups. Name and give a short description of each type and how they are distinct from one another. Provide an example of a macromolecule or other complex structure representing each of the three types.**

**(11) An example of an amino acid is shown below. Answer the following questions relating to its structure.**



- Circle the amine functional group. Is the amine neutral or ionic?
- Put a triangle around the carboxylate functional group. What is the one thing that differs between a carboxylate and a carboxylic acid?
- What is the definition of a zwitterion? Does this particular amino acid fit the definition? Name the amino acids that can NOT be considered a zwitterion at physiological pH.
- Box the entire side chain of the amino acid. Use this to identify the name of this amino acid.
- Describe the character of the side chain. Is it nonpolar, polar, acidic, or basic?
- Sketch the amino acid and what it would look like if you raised the pH up to 11. Is it positively charged, negatively charged or neutral overall? Repeat this with the pH changed down to 4.

**Question 12: Oxytocin, a hormone peptide of nine amino acids, is widely used in obstetrics to induce uterine contractions. There is an intramolecular disulfide bond which must be reduced before sequencing. Reduced oxytocin has the composition Asn Cys<sup>2</sup> Gln Gly Ile Leu Pro Tyr. Partial hydrolysis of reduced oxytocin led to the following fragments.**

Asn-Cys  
Cys-Tyr  
Tyr-Ile-Gln  
Cys-Pro-Leu  
Ile-Gln  
Leu-Gly  
Gln-Asn-Cys

- Reaction of reduced oxytocin with carboxypeptidase showed glycine as the first liberated amino acid. Which one of the following is the sequence of oxytocin?

- A) Asn Cys Tyr Ile Gln Cys Pro Leu Gly
- B) Gln Asn Cys Tyr Ile Cys Pro Leu Gly
- C) Cys Pro Gln Asn Cys Tyr Ile Leu Gly
- D) Cys Tyr Ile Gln Asn Cys Pro Leu Gly
- E) Gln Asn Cys Tyr Ile Cys Pro Leu Gly