### Question bank of amino acids and proteins

## 1. Indicate whether each of the amino acids is polar, nonpolar, basic, or acidic:

Glycine, Proline, Aspartate Lysine, valine, leucine, isoleucine, serine, cysteine threonine, arginine, histidine, Asparagine, Glutamine, phenylalanine, tyrosine, tryptophan.

## 2. Indicate whether each of the amino acids is aliphatic, aromatic, or Heterocyclic amino acids:

Histidine, proline, tryptophan, glycine, alanine, valine, leucine, isoleucine, serine, threonine, cysteine, Glutamine, phenylalanine, tyrosine, methionine, arginine, aspartic acid, glutamic acid

#### 3- Write the net charge of glutamic acid

1- At (PH=1.5) 2- At (PH=2.8) 3- At (PH=7) 4- At (PH=11.5). Then the pI occurs at which of these mediums.

#### 4- Write the net charge of lysine

1- At (PH=2.8) 2- At (PH=7) 3- At (PH= 9) 4- At (PH=11.5). Then the pl occurs at which of these mediums.

#### 5- Write the net charge of glycine

1- At (PH=2.8) 2- At (PH=7) 3- At (PH=9). Then the pI occurs at which of these mediums.

#### 6- Write the net charge of asparagine

1- At (PH=2.8) 2- At (PH=7) 3- At (PH= 9). Then the pI occurs at which of these mediums.

#### 7- Draw the structure of these peptides

Valyl-aspartyl-phenyl alanyl- tyrosyl- argnyl- histidyl- lysine

Methionyl- leucyl- alanyl- isoleucyl-seryl-glutamine

#### 8- Define

Amino acids, Essential amino acids, Non-essential amino acids, Semi-essential amino acids, Zwitterion, Isoelectric point, prosthetic group, Hydrophilic or polar amino acids, Charged Hydrophilic amino acids, Hydrophobic or non-polar amino acids, Non-protein amino acids, cystine, pepide, peptide bonds, primary structure of a protein, fibrous proteins,  $\beta$ -pleated sheet,  $\alpha$ -helix, glycoprotein, Non-protein amino acids, protein, globular proteins, Simple proteins, compound proteins, primary derived proteins, secondary derived proteins, Denaturation of proteins, Primary structure of proteins, secondary structure of proteins, Tertiary structure of proteins

#### 9- Fill in the blanks

- 1- Name the sulfur containing essential amino acid ------,-----
- 2- The charged molecule which is electrically neutral is known as ----
- 3- Two cysteine molecules are joined by a disulfide bond obtain ----, this disulfide bonds help to stabilize the structure of some proteins.
- 4- Some of the less common D- enantiomers of amino acids are also found in nature. For example-----
- 5- Thyroxine and triiodothyronine, two hormones derived from ----amino acid
- 6- Glutathione is a tripeptide containing -----, and -----.
- 7- Denaturation agents of proteins include ----- and ----- or -----.
- 8- Vasopressin and Oxytocin are ----- containing nine amino acids.
- 9- ---- is found free in nature and is a constituent of pantothenic acid
- 10----- and ----- are metabolic intermediates in the biosynthesis of arginine and in the urea cycle.
- II- Amino acids are molecules having two functional groups ----- group and ----- group at α-carbon atom.
- 12----- and ----- both are found in collagen, a fibrous protein of connective tissues.
- 13- If the peptide contains 2-10 amino acid residues, it is called as an ------
- 14----- are composed of polypeptide chains arranged in parallel along a single axis and serve structural roles in cells.
- 15----- proteins are spherical in shape

#### 10. Explain, Why?

- 1- All amino acids are named as  $\alpha$ -amino acids
- 2- All of the L-amino acids except glycine chiral
- 3- Glutathione is an important reducing agent in the tissues

#### 11- Multiple choice questions

1, The imino acid found in protein structure

(a)Arginine (b) Proline (c) Histidine (d) Lysine

2, The following is a non-protein amino acid

(a)Ornithine (b) Homocysteine (c) Histamine (d)All of them.

# 13- Draw the D- and L-isomers of serine. Which would you expect to find in nature?

15- Write the structures of the amino acids that have hydrophobic side chains.

16- Write the structures of the aromatic amino acids.

17- Shown are the structures of several standard amino acids.

- I. Classify them according to whether they are neutral nonpolar, neutral polar, acidic, or basic.
- II. Which form of the amino acid is present at the isoelectric point?



18- Draw the structure of the tripeptide alanyl-glycyl-valine.

#### 19- Write four functions of proteins

20- What type of bond joins the amino acids to one another in the primary structure of a protein?

21- What are the two most common types of secondary structure of proteins?

22- What are the bonds joins the amino acids to one another in the tertiary structure of a protein?