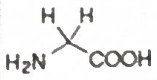
CYL100-End Sem Exam

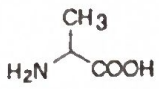
Answer all questions in the answer sheet.

Full marks: 100, Time: 2.5 hours

SMALL

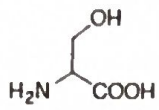


Glycine (Gly, G)
MW: 75.07

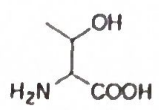


Alanine (Ala, A)
MW: 89.09

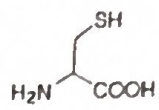
NUCLEOPHILIC



Serine (Ser, S)
MW: 105.09, pK_a ~ 16

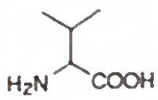


Threonine (Thr, T)
MW: 119.1, pK_a ~ 16

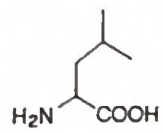


Cysteine (Cys, C)
MW: 121.2, pK_a = 8.18

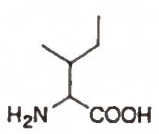
HYDROPHOBIC



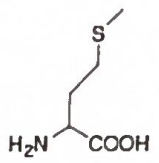
Valine (Val, V)
MW: 117.1



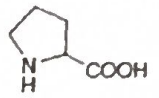
Leucine (Leu, L)
MW: 131.2



Isoleucine (Ile, I)
MW: 131.2

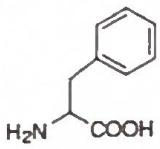


Methionine (Met, M)
MW: 149.2

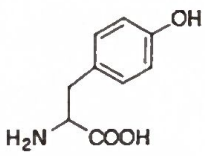


Proline (Pro, P)
MW: 115.1

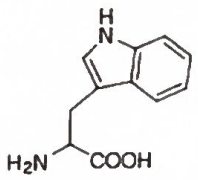
AROMATIC



Phenylalanine (Phe, F)
MW: 165.2

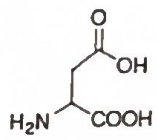


Tyrosine (Tyr, Y)
MW: 181.2, pK_a = 10.46

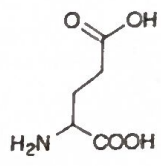


Tryptophan (Trp, W)
MW: 204.2

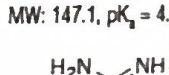
ACIDIC



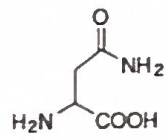
Aspartic Acid (Asp, D)
MW: 133.1, pK_a = 3.9



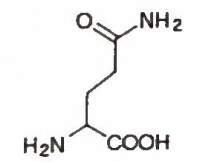
Glutamic Acid (Glu, E)
MW: 147.1, pK_a = 4.07



AMIDE

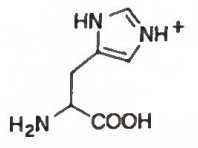


Asparagine (Asn, N)
MW: 132.1

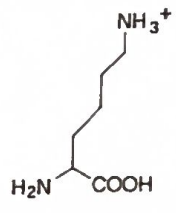


Glutamine (Gln, Q)
MW: 146.1

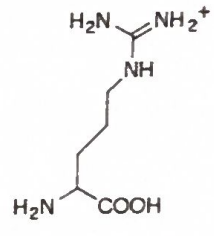
BASIC



Histidine (His, H)
MW: 155.2, pK_a = 6.04



Lysine (Lys, K)
MW: 146.2, pK_a = 10.79



Arginine (Arg, R)
MW: 174.2, pK_a = 12.48

PART A (10 marks, no negative marking)

1. The most abundant element (in weight %) in the human body is Carbon

2. Cytosine, Thymine, and Uracil are structural derivatives of pyrimidine.

3. Butter and oil are examples of Lipids.

4. In the tripeptide Ala-Pro-Ile, the C-terminal residue is Ile.

5. The two amino acids containing sulfur are Cystine and Methionine.

6. The complementary DNA strand TAGCCTAAGC is ATCGGATTCG.

7. Deoxy-ribose is the pentose sugar present in DNA.

8. The structure of collagen is ~~triple~~ helix.

9. Hexose and pentose sugars contain 6 and 5 carbon atoms, respectively.

10. Monosaccharides are connected via ~~glycosidic~~ linkage bonds to form a polysaccharide.

PART B (10 marks, negative -1 marks for wrong answer)

1. Which of the following amino acids has a charged side chain?

A) Leu

B) Ala

C) Met

D) Lys

E) Trp

2. Amphiphilic molecules:

A) have both oxidizing and reducing groups.

B) are micelles.

C) have chromophores in two different wavelength regions.

D) have both acidic and basic groups.

E) have both hydrophilic and hydrophobic groups.

3. Following are an example of soft Lewis acid and soft Lewis base:

A) Na^+ and NH_3

B) Na^+ and H_2S

C) Cu^+ and H_2S

D) Fe^{3+} and H_2S

E) Fe^{3+} and NH_3

4. Oxidoreductase enzyme carry out following reaction:

A) Group transfer.

B) Hydrolysis.

C) Condensation.

D) Isomerization.

E) Oxidation reduction.

5. Metal ion present in hemocyanine is-

A) Fe.

B) Zn.

C) Mn.

D) Na.

E) Cu.

PART C (80 marks, answers to be written in the answer sheet)

1. Draw all possible tripeptide sequences possible with Lys, Phe, and Tyr; where aromatic amino acids are always connected via a peptide bond.

2. Use the Michaelis-Menten Equation to calculate the values of K_m and V_{max} from the table given below. Plot [S] versus V_0. Draw line parallel to the x-axis at V_{max} and extend your plotted line to show its approach to V_{max}.

[S] mM	V_o mmol/s
10	1.2
16.3	1.7
22.9	2.1
24.9	2.2
31.7	2.5

3. According the Michaelis-Menten equation, what is the V_0/ V_{max} ratio when [S] = $3K_m$? If K_m = 3 mM, and V_0= 35 µmol/(mL•s) when [S] = 3 mM, what is the velocity, V_0, for the reaction when [S] = 18 mM?

4. What are the five key structural and functional differences between DNA and Protein?

5. Although hemoglobin subunits and myoglobin are structurally similar, hemoglobin is an oxygen transport protein and myoglobin is an oxygen storage protein. What is the reason behind this difference?

6. A first order reaction takes 8 hours for 90% completion. Calculate the time required for 80% completion.

7. Draw the high-spin and low-spin electronic configuration of an octahedral complex of d^6 metal ion.

8. Briefly describe three different reversible inhibition mechanisms in the enzyme catalysis.