Multiple Choice Questions: Circle the single best answer. No penalty for guessing.

1. When an amide is hydrolyzed, a carboxylic acid is created. What else is simultaneously produced? (4 points)
   A) alcohol    B) acyl group   C) lipid      D) amine      E) amide

2. Which of the following is a disaccharide? (4 points)
   A) lactose    B) fructose      C) glycogen    D) amylose    E) glucose

3. Which of the following classes of molecules is normally **not** saponifiable? (4 points)
   A) triacylglycerides    B) steroids      C) phospholipids
   D) sphingolipids        E) waxes

4. What is the “R” sidechain functional group for the amino acid **serine**? (4 points)
   A) –CH₂CH₃    B) —CH₃        C) —CH₂OH      D) —CH₂SH      E) —CH₂CH₂OH

5. Which of the following is most soluble in a pH = 12 aqueous solution? (4 points)
   A) waxes      B) amine       C) steroids    D) benzene    E) carboxylic acid

6. Which of the following is an example of secondary protein structure? (4 points)
   A) peptide bond   B) double helix   C) hydrogen bond D) α–helix     E) amide linkage

7. Draw one of the 20 naturally occurring amino acids with a non-polar sidechain, indicating the polar and non-polar regions of this molecule. (6 points)
8. Write the structures and IUPAC names of the major products when \( \text{CH}_3\text{CH}_2\text{CO}_2\text{CH}_3 \) (methyl propanate) is hydrolyzed. (12 points)

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\text{CH}_3\text{CH}_2\text{CO}_2\text{CH}_3 + \text{H}_2\text{O} \rightarrow ?
\]

9. Describe in words and pictures the basic differences between glycogen and cellulose. (10 points)

10. Describe and draw the basic structure of a triacylglycerol. (10 points)

11. Describe how phospholipids are important in forming cell membranes. (10 points)
12. Write the name and structure of 4 different **amino acids**. Draw and name 2 different **dipeptide** molecules which may be formed using these amino acids. (15 points)

13. Describe what an **α-helix** is and identify its role in the formation of tertiary and quaternary structure of a protein. (8 points)

14. Draw the α ring form of glucose and identify the hemiacetal present in this molecule. (5 points)