I. Multiple Choice (2% each, 20 questions, total 40%)

1. Buffers are substances that help resist shifts in pH by
   A) releasing H^+ in acidic solutions.
   B) releasing H^+ in basic solutions.
   C) combining with H^+ in basic solutions.
   D) combining with OH^- in acidic solutions.
   E) releasing OH^- in basic solutions.

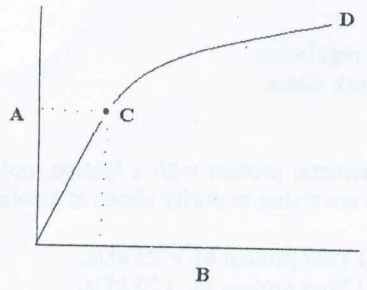
2. What maintains the secondary structure of a protein?
   A) peptide bonds
   B) hydrogen bonds
   C) disulfide bridges
   D) ionic bonds
   E) electrostatic charges

3. Alanine is similar to serine in the same way that
   A) Val is similar to Thr.
   B) Phe is similar to Trp.
   C) Phe is similar to Tyr.
   D) Ser is similar to Thr.

4. An α-helix with 11 amino acid residues completes three turns. The length of this helix is about
   A) 10 Å
   B) 15 Å
   C) 20 Å
   D) 25 Å

5. Subunits of a single enzyme undergo conformational changes individually. Which model of allosteric regulation supports this statement?
   A) The MWC Concerted Model
   B) The Cooperative Binding Model
   C) The sequential Model
   D) The Transition State Model

The Michaelis-Menten equation is v_o=Vmax [S]/(Km+[S]).
Fill in the blanks (questions 6, 7) with the letters shown to correctly label each part of the graph.



6. _____ v_o
7. _____ Point used to determine the Km

8. The turnover number of an enzyme is the rate at which product is formed.

$$E + S \underset{k_2}{\overset{k_1}{\rightleftarrows}} ES \xrightarrow[(v_o)]{k_3} E + P$$

turnover number=k_3=Vmax/[E_T]
This is the maximum rate of product formation if all of the enzyme substrate binding sites are filled. What can the turnover number tell us about an enzyme?
   A) Number of binding sites
   B) Reaction mechanism
   C) Substrate concentration
   D) Enzyme efficiency

9. Bends or loops are considered to be non-regular secondary structures of proteins because they do not repeat. Which of the following is **true** of bends?
A) Bends do not reverse the direction of a polypeptide chain.
B) Bends connect regions of α-helixes and β-sheets.
C) Glycine and proline are absent from bends.
D) Bends are usually found at the C terminus.

10. Collagen is best described as
A) an α-helical structural protein.
B) a coiled-coil found in hair.
C) a cross-linked globular protein.
D) a triple-helical fibrous protein.

11. The Hill coefficient (n_H) for myoglobin is ____; whereas n_H is about ___ for hemoglobin.
A) 2.8; 1.0
B) 1.0; 2.8
C) 1.0; 4.0
D) 4.0; 1.0
E) None of the above choices are correct.

12. The relationship between an enzyme and a reactant molecule can best be described as:
A) a temporary association.
B) an association stabilized by a covalent bond
C) one in which the enzyme is changed permanently.
D) a permanent mutual alteration of structure.
E) noncomplementary binding.

13. The K_m is:
A) The time for half of the substrate to be converted to product.
B) The time for all of the substrate to be converted to product.
C) The [S] that gives half of the maximum reaction rate.
D) The [S] that gives the maximum reaction rate.
E) The [P] that is produced when the enzyme is saturated with the substrate.

14. An allosteric inhibitor of an enzyme usually
A) binds to the active site.
B) participates in feedback regulation.
C) denatures the enzyme.
D) causes the enzyme to work faster.
E) is a hydrophobic compound.

15. The void volume of a gel filtration column, V_o = 30 mL. A monomeric protein with a known molecular weight of 25 kDa elutes at a volume of 45 mL. The protein that you are trying to purify elutes at a volume of 35 mL. Which of the following is a valid conclusion?
A) Your protein is repelled by the gel filtration material.
B) Your protein M_r = 25 kDa.
C) Your protein M_r >25 kDa.
D) Your protein M_r < 25 kDa.

16. A noncompetitive inhibitor of an enzyme-catalyzed reaction
A) increases K_M and increases V_{max}.
B) increases K_M and reduces V_{max}.
C) reduces K_M and increases V_{max}.
D) reduces K_M and reduces V_{max}.

17. The strong conclusion from Anfinsen's work on RNaseA was that:
A) 100% enzyme activity corresponds to the native conformation.
B) urea can reversibly denature proteins *in vivo*.
C) mercaptoethanol can reduce disulfide bonds *in vitro*.
D) the native conformation of a protein is adopted spontaneously.

18. Catalytic antibodies act like enzymes in that they:
A) Obey Michaelis-Menten kinetics
B) Bind to substrates in the transition state
C) Bind to antigen
D) Need cofactors to function

19. The peptide, Val-Lys-Glu-Met-Ser-Trp-Arg-Ala, was digested with chymotrypsin to produce:
A) Val-Lys + Glu-Met-Ser + Trp-Arg-Ala.
B) Val-Lys-Glu-Met-Ser-Trp + Arg-Ala.
C) Val-Lys-Glu-Met-Ser + Trp-Arg-Ala.
D) Val-Lys-Glu + Met-Ser-Trp-Arg-Ala.
E) Val-Lys-Glu-Met + Ser-Trp-Arg-Ala.

20. The molecular formula for glycine is $C_2H_5O_2N$. What would be the molecular formula for a linear oligomer made by linking ten glycine molecules together by condensation synthesis?
A) $C_{20}H_{50}O_{20}N_{10}$.
B) $C_{20}H_{32}O_{11}N_{10}$.
C) $C_{20}H_{40}O_{10}N_{10}$.
D) $C_{20}H_{68}O_{29}N_{10}$.
E) None of the above.