

Biochemistry 694:301
Second Test Dr. Deis
Wed. Mar. 8, 2006

Name _____

Row Letter ____ Seat Number _____

This exam consists of two parts. Part I is multiple choice. Each of these 25 questions is worth two points. Answer the Part I questions on this sheet, below. Answer the Part II questions on the question pages.

Please use BLOCK CAPITAL letters like this --- A, B, C, D, E. Not lowercase!

- | | | |
|----------|-----------|-----------|
| 1. _____ | 10. _____ | 18. _____ |
| 2. _____ | 11. _____ | 19. _____ |
| 3. _____ | 12. _____ | 20. _____ |
| 4. _____ | 13. _____ | 21. _____ |
| 5. _____ | 14. _____ | 22. _____ |
| 6. _____ | 15. _____ | 23. _____ |
| 7. _____ | 16. _____ | 24. _____ |
| 8. _____ | 17. _____ | 25. _____ |
| 9. _____ | | |

GRADE:

Part I Total _____

Part II:

II-1 _____

II-2 _____

II-3 _____

II-4 _____

II-5 _____

Part II Total _____

Total, I & II _____

1. Which of the following is a negative allosteric modulator of Myoglobin?
A. H^+
B. CO_2
C. 2,3 BPG
D. all of the above
E. none of the above
2. If a solution of Hemoglobin is 50% oxygenated, it consists of
A. 100% $Hb(O_2)_2$, "dioxyHb."
B. 20% Hb, 20% $Hb(O_2)$, 20% $Hb(O_2)_2$, 20% $Hb(O_2)_3$, 20% $Hb(O_2)_4$
C. 33% Hb, 34% $Hb(O_2)_2$, 33% $Hb(O_2)_4$
D. 50% Hb, 50% $Hb(O_2)_4$
E. none of the above
3. The conformation of deoxy-hemoglobin is called
A. tense
B. relaxed
C. round
D. pentagonal
E. ternary
4. Carbon monoxide prevents Hemoglobin from working properly by
A. binding to the central cavity of the tetramer
B. inhibiting the ability of oxygen to cross RBC membranes
C. binding to the heme iron of each subunit
D. none of the above
5. Which of these is a reducing sugar?
A. Lactose
B. Maltose
C. Cellobiose
D. all of the above
6. 2-Acetyl Fructose would be a (an)
A. Acetal
B. Hemiketal
C. Glycoside
D. Reducing sugar
E. Disaccharide
- 7.* What sugar is this?
A. Galactose
B. Mannose
C. Glucose
D. Allose
E. Fructose
8. Which of the following statements about biological membranes is *not* true?
A. they contain carbohydrates covalently bound to proteins and lipids
B. they are very large sheetlike structures with closed boundaries
C. they are symmetrical due to the symmetry of the lipid bilayers
D. they contain specific proteins that mediate their distinctive functions
9. Sphingomyelin contains Sphingosine, a fatty acid, and what?
A. glucose
B. an oligosaccharide
C. phosphate and choline
D. phosphate and serine
E. a second fatty acid

- 10.* The figure at right represents
- A. an Archaeon
 - B. a gram-positive bacterium
 - C. a gram-negative bacterium
 - D. a Eukaryotic cell
11. Which of the following is an ABC protein?
- A. Flippase
 - B. Multidrug Resistance Protein
 - C. GLUT4 Receptor
 - D. Acetylcholinesterase
12. The first symptom of Tetrodotoxin poisoning would be
- A. lips feel numb
 - B. heart explodes
 - C. can't breathe
 - D. blindness
13. The Acetylcholine receptor is
- A. an enzyme that breaks down ACh
 - B. a voltage gated ion channel
 - C. a ligand gated ion channel
 - D. found in the endoplasmic reticulum
14. Acetylcholinesterase is very fast, the turnover number is
- A. 250/sec
 - B. 2500/sec
 - C. 25,000/sec
 - D. 250 million /sed
 - E. unmeasurable
15. When $[ATP] = 5 \text{ mM}$, $[ADP] = 4 \text{ mM}$, and $[AMP] = 1 \text{ mM}$, the Atkinson Energy Charge Function has the value:
- A. 1.0
 - B. 0.83
 - C. 0.70
 - D. 0.50
 - E. 0.33
16. Glycolysis is part of which of "stage" of catabolism?
- A. I
 - B. II
 - C. III
 - D. not part of catabolism
17. Several cofactors including Coenzyme A, FAD, and NAD have what in common?
- A. Nicotinamide
 - B. Pantothenate
 - C. Flavine
 - D. ADP moiety
 - E. A selenium atom
18. Protein Kinase A phosphorylates enzymes on what kind of residue?
- A. Tyr
 - B. Ser
 - C. His
 - D. Ala
 - E. Cys

PART II Answer these questions here on the question pages.

1. a. On the axes provided, draw the loading curves for Hemoglobin and Myoglobin. Label which is which and indicate the P_{50} for each.

(4)

- b. Sketch a Heme group, **and** show a sideways view of the heme illustrating how it binds to the F-helix in hemoglobin.

(3)

- c. Draw D-mannopyranose β 1-4 α -D-sedoheptulopyranose in the Haworth ring form. For partial credit just draw each sugar in the Fischer projection.

(3)

2. a. Sketch the Acetylcholine Receptor and tell how it works – what happens when it is stimulated? How many subunits does it have?

(3)

- b. Describe the voltage gated sodium channel which is found in nerve membranes. Sketch the three states of this channel.

(3)

- c. Draw a steroid nucleus, and draw Glucose Cerebroside (detailed structure)

(4)

3.* a. What cofactors are represented below?

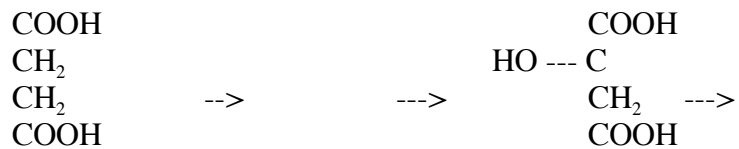
(4)



What is the standard free energy change for
 A \rightarrow C? Show work and circle answer.

(4)

c. Fill in missing cofactors and structures from the Metabolic Motif below:
 (2)



4. a. For each statement, put "A" if it applies to Protein Kinase A, "C" if it applies to Protein Kinase C, and "B" if it applies to both. Be careful, if "B" is the answer there is no partial credit for A or B.

(7)

1-Process begins with stimulation of 7TM receptor _____

2-G protein activates Adenylate Cyclase _____

3-IP3 opens Calcium channels _____

4-G protein activates Phospholipase C _____

5-Pseudosubstrate is removed from active site _____

6-Kinase binds to membrane _____

7-Enzyme transfers P from ATP to Serine res. _____

- b. Name 3 "biological functions" mediated by 7TM receptors.
(3)

5. a. Show the reactions of Glycolysis starting with Glucose-6-P and ending with 3 Phosphoglycerate. Draw all reactants and products, indicate all cofactors and name all enzymes. 1/2 point per fact.

(8)

- c. What effect does Insulin have on GLUT4 receptors?
(2)