Biology 150: 3rd in-class examination **Name**_____
March 31, 2014

Indicate the lab you are registered in:

Monday, 1-2:50 _____ ; Tuesday, 10-11:50 _____; Tuesday, 1-2:50 _____ ; Tuesday, 3-4:50 _____

Answer the questions in the space provided and you may also use the back of the page to complete your response. There are 22 questions worth a total of 50 points (plus three bonus questions). The point value of individual questions appears in parentheses.

1. Name the two forms of membrane cotransport and explain how they differ from each other. (2)

2. Name three forms of endocytosis and indicating how they differ from each other. (3)

3. What does the second law of thermodynamics state? (1)

4. When O_2 and wood combine in combustion to produce H_2O and CO_2: (3)
   a) Is ΔG negative, positive, or neither?

   b) Is ΔH negative, positive, or neither?

   c) Is ΔS negative, positive, or neither?

5. If, for a specific reaction where A↔B, Keq has a value of 0.5: (2)
   a) Is the reaction considered spontaneous?

   b) If, once this reaction is at chemical equilibrium, and the concentration of the product (B) equals 1 M, what will the concentration of A be?

6. Reaction rate is determined by which one(s) of the following: ΔG, ΔH, ΔS, and/or E_a? (1)

7. Comparing an enzyme catalyzed reaction to the same reaction uncatalyzed: (1)
   a) ΔG is more negative
   b) ΔG is more positive
   c) E_A is smaller
   d) both a and c
   e) none of the above

8. The location on an enzyme where the catalyzed reaction takes place is called _____ (1).

9. Enzymes are said to be highly specific. What does this mean? (1)

10. Describe the catalytic cycle of an enzyme. What happens in what order? Roughly how fast can the cycle occur with a typical enzyme? (3)

11. Contrast competitive enzyme inhibition and non-competitive inhibition. How do they differ? Which of these is a form of allosteric regulation? (3)

12. ATP hydrolysis is frequently used to provide the energy to drive otherwise energetically unfavorable reactions in so called "coupled reactions". Explain, and/or diagram, how this actually occurs. (3)

13. Outline glycolysis. Indicate the starting molecule, the use and production (and how many) of energy and electron carrier molecules. Name at least one intermediate molecule and the resulting partially oxidized product molecule(s). (4)

14. What happens in pyruvate oxidation? (1)

15. Outline the Kreb's (citric acid) cycle. What molecule donates carbon to the pathway combining with what four carbon molecule? What six carbon molecule is produced? In a single turn of the cycle indicate the important redox reactions and any ATP produced. What is the fate of the donated carbon molecules? (4)

16. What is chemiosmosis? (1)

17. In glycolysis and aerobic respiration of a single molecule of glucose a total of 30 and 32 molecules of ATP are produced. Give and accounting of where the ATP is produced and explain why some cells produce more ATP than others. (4)

18. What function does fermentation serve? (1)

19. Explain *how* dinitrophenol (DNP), if taken in low doses, would effectively cause weight loss. (2)

20. What is VO2 max? If an athlete significantly improved his VO2 max which would most improve his sprinting, middle distance running, or marathon running? Why? (3)

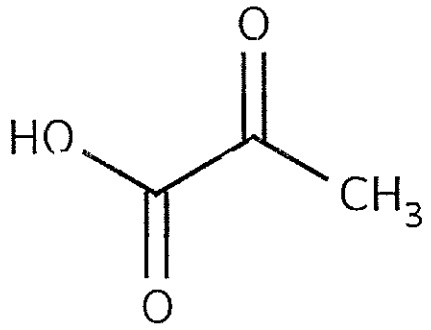
21. Describe the composition of a light harvesting complex. (1)

22. Cyclic photophosphorylation occurs in the _____ membrane where light energy is first absorbed by chlorophyll molecules attached to individual proteins which are clustered together in groups of three called _____. The light energy is passed pigment to pigment until it reaches a special chlorophyll called _____ which is attached to a reaction center protein. From here, an energized electron is passed to an electron transport chain leading back to _____. Some energy lost in this process is coupled to the transport of _____. (5)

Bonus questions:

(1) In the second reaction of glycolysis, glucose-6-phosphate is isomerized to fructose-6-phosphate. The measured Keq of this reaction shows ΔG to be somewhat positive. Explain why or how this reaction is made to proceed. (2)

(2) What is the name of this molecule? (1)



(3) What is cooperativity? (2)