

Mol Bio Biochem 694:407 &115: 511
Second Hourly, Deis
Tuesday, Oct. 28, 2003

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 _____

8. Sephadex is a brand named Dextran, used in gel filtration columns. Chemically, Sephadex is poly (what?) linked (how?).
- | | |
|-------------------|------------------|
| A. Galactose, 1,4 | D. Glucose 1,6 |
| B. Glucose, 1,4 | E. Galactose 1,4 |
| C. Mannose 1,6 | |
9. A cerebroside is made up of Sphingosine **plus** what?
- | | |
|--------------------------------------|-----------------------------------|
| A. 2 fatty acids, glucose, phosphate | D. fatty acid, glucose |
| B. fatty acid, glucose, phosphate | E. fatty acid, choline, phosphate |
| C. ceramide, glucose | |
- 10.* Which lipid is represented here?
- | | |
|----------------|------------------------------|
| A. Lecithin | C. Phosphatidyl Serine |
| B. Cardiolipin | D. Phosphatidyl Ethanolamine |
11. A common fatty acid is Linoleic Acid, which has the structure
- | | |
|-------------------|----------------|
| A. 18:0 | D. 18:2, 6, 9 |
| B. 18:1 7 | E. 18:2, 9, 12 |
| C. 18:3 9, 12, 15 | F. 16:1, 8 |
12. One enzyme found in cobra venom is Phospholipase A2, which cleaves membrane phosphatidyl lipids producing
- | | |
|-------------------|-------------------|
| A. Diacylglycerol | D. Triglycerides |
| B. Phosphatidate | E. Saponification |
| C. Lysolecithin | |
13. What is Anabolism?
- | | |
|------------------------|-----------------------------------|
| A. DNA repair | D. All "energy reactions" in cell |
| B. building molecules | E. none of the above |
| C. breaking down foods | |
14. Glycolysis is part of which of "stage" of catabolism?
- | | |
|-------|---------------------------|
| A. I | C. III |
| B. II | D. not part of catabolism |
15. Several cofactors including Coenzyme A, FAD, and NAD have what in common?
- | | |
|-----------------|--------------------|
| A. Nicotinamide | D. ADP moiety |
| B. Pantothenate | E. A selenium atom |
| C. Flavine | |
16. Which cofactor forms a Schiff Base with substrate?
- | | |
|------------------------|---------------|
| A. Biotin | D. Thiamine |
| B. Lipoic Acid | E. Coenzyme A |
| C. Pyridoxal Phosphate | |

17. The mechanism of G3PDH involves covalent attachment of substrate to which amino acid at the enzyme's active site?
A. Ser
B. Cys
C. Lys
D. His
E. Glu
18. What is the significance of Fru-2,6-bisphosphate in the cell?
A. "I'm hungry"
B. "not enough Glucose"
C. "there's a lot of Glucose"
D. "Too much Calcium"
E. "Too much AMP"
19. The greatest difference between Aerobic and Anaerobic fates of Pyruvate comes in the way (what?) is utilized.
A. ATP
B. Coenzyme A
C. Thiamine
D. NADH
E. Glyceraldehyde
20. Which Glycolysis enzyme has an unusually high positive standard free energy change (in the "forward" direction of Glycolysis)?
A. Aldolase
B. Hexokinase
C. Fructonase
D. UDP Gal Epimerase
E. PG Kinase
21. The Citric Acid Cycle occurs where in eukaryotic cells?
A. the cytoplasm
B. the mitochondrial matrix
C. the lumen of the E.R.
D. the nucleus
E. the mito. intermembrane space
22. Unlike other species, organisms that have the Glyoxylate Cycle can
A. make fatty acids from glucose
B. run the Citric Acid Cycle backward
C. make glucose from fatty acids
D. make Acetyl CoA from fatty acids
23. Citrate Synthase is allosterically inactivated by what 2 compounds?
A. F 2,6 BP and CoA
B. NADPH and Citrate
C. Vitamin C and Glucose
D. ATP and NADH
E. ADP and Pyruvate
24. In the mechanism of the Pyruvate DH Complex, Pyruvate is decarboxylated in the first step by reacting with TPP. The cofactor responsible for the second step is
A. ADP
B. NADPH
C. Lipoamide
D. FAD
E. Ubiquinone
25. After this test I will
A. laugh
B. cry
C. drink
D. cannot tell from data provided

Answer these questions here on the question pages.

1. a. On the axes below, draw the loading curves for Hemoglobin and Myoglobin and label which is which. Also give the approximate P_{50} in torr for each curve.

(3)

- b. Draw a heme group (or a Tetrapyrrole ring).

(3)

- c. Discuss why steric hindrance around the heme group in globin proteins is beneficial. How does binding of O_2 or CO differ when free heme is studied in solution? How does the geometry of binding enter into it?

(4)

2. a. Draw D- galactofuranosyl 1-4 -D- Fructofuranose. For partial credit just draw D-galactose and D-fructose in the Fischer projection.

(4)

- b. Label each lipid "Prokaryotic," "Eukaryotic," or "Archaeal"
- (2)

- c. Label the pictures below as gram negative and gram positive, and briefly discuss the significance of the differences for the 2 kinds of bacteria.

3.* a. What cofactors are represented below?

(6)

b. What is the free radical theory of ageing? What vitamins are considered to be anti-oxidants?

(4)

4. a. Show how Glycolysis would convert Fructose-1,6-BP into PEP. Draw all reactants and products, name all enzymes, and indicate all cofactors. You do not need to show mechanisms. One half point per fact. If you need to use the back, be sure to say "see back!"

(8)

- b. On the axes below, show how the activity of PFK-I varies when ATP concentration is varied, in the absence and presence of Fru-2,6-BP. Draw two curves and label "-" for absence and "+" for presence.

(2)

ATP ->

5. a. Show how Succinate would be converted into Isocitrate by the enzymes of the Citric Acid Cycle. Draw all reactants and products, name all enzymes, and indicate all cofactors. Go "forward" around the cycle and do not reverse any irreversible reactions. About 1/2 point per fact.

(8)

- b. Draw Thiamine and Pyruvate and show how they would react to decarboxylate the Pyruvate.

(2)