Introduction to Microbiology
BIOL 220, Summer Session 1, 1996
Exam # 2

Name _____

I. Multiple Choice (1 point each)

__D___1. Which transport process requires energy?
A. Osmosis C. Diffusion
B. Facilitated diffusion D. Active transport

__D___2. Which of the following in NOT true of the gram positive cell wall?
A. The peptidoglycan layer is thicker than the layer in gram negative cells.
B. It may contain teichoic acid.
C. It is easily penetrated by penicillin.
D. It contains lipopolysaccharides.

__C___3. Which component of the gram-negative cell prevents the passage of most hydrophobic and large hydrophillic molecules?
A. Peptidoglycan C. Outer membrane
B. Inner membrane D. Teichoic acid

__C___4. A bacterial culture, with an initial populations size of 300, has a doubling time of 30 minutes. How many cells will be present after 2 hours?
A. 1200 C. 4800
B. 2400 D. 9600

__B___5. During which phase of a growth curve do you think that bacteria are most sensitive to antibiotics?
A. Lag C. Stationary
B. Exponential D. Death

__B___6. Which of the following environments would favor a psychrophile?
A. Skin of a desert animal C. Hot sulfur spring
B. Refrigerator D. Soil

__A___7. Which of the following would be an example of a continuous culture?
A. Bacteria growing in the gastrointestinal tract.
B. Bacteria growing in a test tube in the lab.
C. Bacteria growing on unrefrigerated food.
D. Bacteria growing on blood agar.

__C___8. An organism growing in an unopened can of vegetables is probably a(n)...

A. Facultative anaerobe
B. Obligate aerobe
C. Obligate anaerobe
D. Microaerophile

__D___9. Which is TRUE of anabolism but not catabolism?

A. Energy is given off and complex molecules are broken down.
B. Energy is given off and simple molecules are broken down.
C. Energy is required and simple molecules are made.
D. Energy is required and complex molecules are made.

__B___10. Which of the following is **NOT** TRUE of enzymes?

A. They typically have only one or two substrates.
B. They are required in large quantities.
C. They are still present in original form at the end of the reaction.
D. They often require small molecules to function.

__D___11. Which of the following is TRUE of a competitive inhibitor of enzyme activity?

A. It interacts with enzyme at a site other than the active site.
B. It typically interferes with many enzymes.
C. Its effects are usually irreversible.
D. It cannot be converted to products by the enzyme which it inhibits.

__A___12. What is the function of enzymes within cells?

A. To lower the activation energy of the reaction.
B. To raise the activation energy of the reaction.
C. To add energy to substrates.
D. To slow down spontaneous reactions.

__A___13. ATP is important in cells because .....

A. It transfers energy from exergonic reactions to endergonic reactions.
B. It is polymerized to become a membrane component.
C. It acts as an enzyme.
D. It changes the rate of diffusion.

__C___14. The main function of glycolysis is the .....

A. Removal of hydrogen from glucose.
B. Synthesis of glucose.
C. Splitting of a six-carbon sugar to yield two three-carbon compounds.
D. Production of ATP.

__D___15. Which of the following is TRUE of glycolysis?

A. It requires ATP but produces no ATP.
B. It doesn't require ATP but produces ATP.

C. It neither requires nor produces ATP.
D. It both requires and produces ATP.

__A___16. In fermentation .....
A. Both the electron donor and final acceptor are organic molecules.
B. Only the final electron donor is organic.
C. Only the final electron acceptor is organic.
D. Neither the electron donor nor the final electron acceptor is organic.

__E___17. Which of the following is **NOT** TRUE concerning fermentation?
A. Production of small amounts of ATP.
B. It regenerates NAD.
C. It provides useful products.
D. It continues the breakdown of glucose.
E. All of these statements are TRUE.

__C___18. In prokaryotes, where are the proteins of the electron transport system located?
A. Cytoplasm
B. Mitochondria
C. Plasma membrane
D. Cell wall

__A___19. Oxygen is necessary in aerobic respiration because.....
A. It is the final electron acceptor.
B. It makes lots of ATP.
C. Cells must have water to survive.
D. It makes glucose metabolism more efficient.

__B___20. The chemiosmotic hypothesis proposes that .....
A. Osmosis is necessary to make ATP.
B. ATP is generated as a consequence of a proton gradient.
C. Oxygen is necessary to make ATP.
D. The movement of free electrons causes ATP to be made.

_____21. Which of the following statements is FALSE concerning the bacteria plasma membrane?
A. It is selective in the transport and movement of molecules in and out of the cell.
B. It contains the enzymes involved in the electron transport system.
C. It contains teichoic acid in Gram positive cells.
D. It is the site of attachment of the bacterial chromosome.

II. Fill-In

22. _____ _____ is a process in which molecule bind to a membrane receptor and move across the membrane from higher to lower concentration at a fast rate.

23-26. The four phases of the growth curve are: _____, _____, _____, and _____.

27. _____ are organisms that use inorganic carbon (CO_2) as their sole source of carbon.

28. _____ are organisms that require a supply of carbon in the form of organic molecules.

29. Organisms that grow best at temperatures above 40°C are termed _____.

30. Organisms that grow best at pH levels of 5.0 or below are called _____.

31-32. The disaccharide lactose is composed of _____ and _____.

33-34. The disaccharide sucrose is composed of _____and _____.

35-36. Two ways to determine the number of bacteria present in a sample would be: _____ and _____.

37-38. _____ is a term that describes the synthesis of molecules and _____ involves the degradation of molecules in the overall metabolic process.

39-40. _____ is the gain of electrons, and _____ is the loss of electrons.

41-42. Two typical carriers of electrons (electron acceptors) are: _____ and _____.

43-44-45. An example of a coenzyme would be _____ and an example of a cofactor would be _____. Both of these are referred to as _____ _____ and are a necessary part of some enzymes to make them functional.

46. A _____ enzyme inhibitor is one that is an analogue to the normal substrate, and its ability to inhibit is reversible.

47-48. An enzyme contains an _____ _____ where the substrate binds, and the enzyme works by putting stress on the chemical bonds of the substrate and _____ _____ _____.

49. If an organic comound is both the electron donor and the final electron acceptor the metabolic process is called _____.

50. If an organic molecule is the electron donor and the final electron acceptor is an inorganic molecule such as Nitrate or CO_2, the process is called _____.

51. Most of the ATPs that are made during aerobic respiration are made in the _____ _____.

52. One product of fermentation is _____.

53. Decarboxylation of pyruvic acid produces NADH and the 2-carbon molecule _____ which then is able to go into the Krebs cycle and make a six carbon citric acid molecule.

54. Peptidoglycan is composed of two sugar molecules, _____ and _____ as well as a _____.

55-56. A spectrophotometer will measure either the percent transmission of light or the _____, and as the amount of bacteria increases the percent transmission of light will _____(increase/decrease).

III. True-False

__T___57. A cell placed into a hyperosmotic medium will shrink.

__F___58. Agar supplies a nice source of nutrients for bacterial growth.

__F___59. There is no bacterial replication during the stationary phase of the growth curve.

__T___60. Growth of *Mycobacterium leprae* occurs only in humans and armadillos.

__F___61. *Helicobacter* is considered a true acidophile.

__T___62. The energy for formation of bacterial ATP comes from the ability of the cell to pump electrons outside the cell membrane so that they can pass through a channel that is associated with an ATPase enzyme.

__F___63. Receptors on the bacterial cell membrane tell the bacteria when to start producing energy.

__T___64. Every oxidation reaction is coupled with a concurrent reduction reaction.

__F___65. Enzymes are used up in the process of catalyzing substrate degradation.

__F___66. Lysozyme kills all Gram positive bacteria.

Complete the missing information in the following Table: (9 points {½ pt each box})

Agar Medium	**Type** *Selective/Differential*	**Special Ingredients**	**Bacteria Isoloated**
SS agar	**Selective**	**Bile salts & Neutral Red**	*Salmonella & Shigella*
MacConkey's Agar	**Selective/ Differential**	Crystal Violet & Bile Salts	**Enteric G- bacilli**
Eosin methylene blue	**Selective/ Differential**	**Eosin & Methylene Blue**	**Enteric G- bacilli**
Mannitol Salt Agar	**Selective/ Differential**	Sodium chloride & Phenol Red	***Staphylococcus***
Blood Agar	**Differential**	**Blood**	***Streptococci***
Chocolate Agar	**Enriched**	Heated Blood	***Neisseria***

BONUS:

Give the number of ATP molecules made and the number of NADH and $FADH_2$ molecules made at each pathway: (5 points)

	ATP	NADH	$FADH_2$
Glycolysis			
Pyruvic acid --->Acetyl CoA			
Krebs Cycle			

Total ATP from all of these