

BIOS 100 - Summer 2007
Exam IV, 20 July, 2007
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Name:
TA:

This exam consists of 54 questions over 6 pages. Please check to see that all the pages are present before you begin. Use a #2 pencil and bubble in all answers. Your score will be posted on the UIC Blackboard site as soon as they are in. No kidding. Good Luck!

1. What type of bond is responsible for holding the two strands of double stranded DNA together?
A. Polar B. Covalent C. Ionic
2. An alpha helix is what type of protein structure?
A. Primary B. Secondary C. Tertiary D. Quaternary
3. Which of the following statements about water is FALSE?
A. Water is a polar molecule
B. Water has a high surface tension
C. Water has a low specific heat capacity
D. Water has strong adhesive and cohesive properties
E. Water can act as both an acid and a base
4. What type of bond joins two amino acids in a protein?
A. Protein bond B. Phosphodiester bond C. Peptide bond
D. Glycosidic bonds E. Proteaceous bonds
5. When you burn methane (CH_4) to form CO_2 and H_2O , the carbon becomes:
A. Oxidized B. Reduced C. Neither
6. Which of the following statements about enzymes is FALSE?
A. Enzymes speed up a chemical reaction by lowering the activation energy of the reaction.
B. Enzymes catalyze both the forward and reverse reactions
C. Some enzymes may become consumed in the reaction
D. Many enzymes are sensitive to external environmental conditions like temperature and pH
E. Many enzymes are allosterically regulated
7. Rubisco catalyzes the fixation of CO_2 to RuBP. It also can fix an O_2 to RuBP. What is the relation of O_2 to CO_2 in this example?
A. O_2 is a substrate to CO_2 B. O_2 is an agonist to CO_2
C. O_2 is an allosteric inhibitor to CO_2 D. O_2 is a competitive inhibitor to CO_2
8. Which of the below cellular structures is incorrectly matched with its function:
A. Ribosome - site of protein synthesis B. Golgi apparatus - distribution of proteins
C. Nucleolis - synthesis of lysosomes D. Mitochondria - site of aerobic respiration
E. Smooth ER - synthesis of lipids

9. Which of the below characteristic are important in the generation and maintenance of turgor pressure?
- A. Chloroplast B. Cell Wall C. Central vacuole
D. B & C E. A, B, & C
10. Which of the following characteristics/processes is NOT found in all cells?
- A. Protein synthesis B. DNA synthesis C. Enzyme-catalyzed reactions
D. Glycolysis E. Aerobic respiration
11. This molecule is the principle component of a plasma membrane.
- A. Triglyceride B. Phospholipid C. Cholesterol
D. Water E. Proteins w/ alpha helices
12. Which of the following statements about biological membranes is FALSE?
- A. Lateral movement of phospholipids is much more common than a “flip flop”
B. Increasing the saturation of the fatty acids of phospholipids will decrease membrane fluidity
C. Increasing the concentration of cholesterol in a membrane will decrease membrane fluidity
D. Biological membranes have a uniform distribution of proteins
E. Integral proteins typically possess several alpha helices
13. Solutions A and B are separated by a plasma membrane. Solution A has a concentration of 0.25 M glucose and solution B has a concentration of 0.5 sucrose. Which way will water move?
- A. From A to B B. From B to A C. No net movement of water
14. A cell has an internal solute concentration of 0.66M. It is placed in a solution of 1.00M NaCl. The external solution is _____ to the cell.
- A. Isotonic B. Hypertonic C. Hypotonic
15. The Na⁺/K⁺ pump is an example of:
- A. A molecular channel B. A facilitated diffusion transport protein
C. An active transport symport D. An active transport antiport
16. Why does the cell convert glucose taken in by the glucose facilitated diffusion transport protein to glucose-6-phosphate?
- A. To make it easier for the glucose to enter into the Krebs cycle
B. Glucose is unstable inside the cell, so it is converted to glucose-6-phosphate
C. Glucose-6-phosphate is unable to leave the cell via the facilitated diffusion transport protein
D. Glucose-6-phosphate is more energized so it will remain in the cell
E. None of the above
17. Plant cells contain functional mitochondria
- A. True B. False

18. Which of the below statements (A-D) about the various types of photosynthesis is FALSE?
- C₃ plants utilize PEP carboxylase when they fix CO₂
 - C₄ plants typically possess Kranz anatomy
 - C₄ plants are typically found in hot, dry environments
 - CO₂ is fixed twice in both C₄ and CAM plants
 - CAM plants typically open their stomates at night
19. From where does PSII (p680) replenish its lost electron?
- H₂O
 - O₂
 - CO₂
 - PSI (p680)
 - NADPH
20. Which of the below statements (A-D) about Rubisco and photorespiration is FALSE?
- Rubisco is a large and very slow enzyme with an active site that fits both CO₂ and O₂
 - Rubisco is concentrated in the bundle sheath cells of C₄ plants
 - The products of photorespiration, glyceraldehyde and phosphoglycolate, are both useful in photosynthesis
 - C₃ plants experience much more photorespiration than do C₄ plants
21. Which color of light is maximally absorbed by chlorophylls a and b?
- Blue
 - Green
 - Yellow
 - Red
 - Infrared
22. Which of the following molecules is NOT bound to the thylakoid membrane?
- PSII (P680)
 - PSI (P700)
 - Phaeophyton
 - NADP
23. Cyclic photophosphorylation produces _____. Noncyclic photophosphorylation produces _____.
- ATP only; ATP only
 - ATP only; ATP and NADPH
 - ATP and NADPH; ATP only
 - ATP and NADPH; ATP and NADPH
24. Which process below does not produce ATP?
- Glycolysis
 - Oxidation of pyruvate
 - Krebs cycle
 - Oxidative phosphorylation
25. What is the function of lactic acid fermentation in human muscle cells?
- To regenerate NAD⁺ from NADH
 - To generate lactic acid to aid in respiration
 - To lower the pH of the muscle cells
 - To generate ATP
 - None of the above
26. What is the relationship between ATP and phosphofructokinase?
- ATP is a substrate of phosphofructokinase
 - ATP is a competitive inhibitor of phosphofructokinase
 - ATP is an allosteric regulator of phosphofructokinase
 - A & B
 - A & C

27. Which process below produces the most ATP?
 A. Glycolysis
 B. Oxidation of pyruvate
 C. Krebs cycle
 D. Oxidative phosphorylation
28. DNA replication is:
 A. Liberal B. Conservative C. Semi-conservative D. Dispersive
29. What is the function of ligase?
 A. Seal nicks and breaks in the DNA chain
 B. Remove supercoils
 C. Base pair nucleotides
 D. Unwind DNA
 E. Create a primer
30. Which of the following statements (A-D) about telomeres and telomerase is FALSE?
 A. Telomeres are regions located on the ends of eukaryotic chromosomes which contain repeating sequences of DNA
 B. Telomerase activity helps to prevent the loss of chromosomal function in eukaryotic cells
 C. Telomere regions are lacking in prokaryotes
 D. Almost all human cells contain telomerase
31. Which of the above is not necessary for initiation of protein synthesis?
 A. A large ribosomal subunit
 B. A small ribosomal subunit
 C. A charged tRNA in the P site
 D. A charged tRNA in the A site
 E. A mRNA
32. What is the start codon?
 A. 5' GUA 3' B. 5' UAA 3' C. 5' AUG 3' D. 5' UGA 3'
33. What is the anticodon to the following codon: 5' UCA 3'
 A. 5' UCA 3' B. 5' ACU 3' C. 3' AGU 5' D. 3' UGA 5'
34. Which of the following statements about the *lac* operon is FALSE?
 A. The *lac* operon contains three genes necessary for the breakdown of lactose
 B. The repressor protein will be bound to the operator when no lactose is present
 C. Lactose can bind to the allosteric site of the repressor protein, causing it to become unable to bind to the operator
 D. The *lac* operon will be on at full capacity if both lactose and glucose are present
 E. CRP (activated by binding w/ cAMP) is necessary for RNA polymerase to bind to the promoter
35. When do the homologous chromosomes separate during meiosis?
 A. Metaphase I B. Anaphase I C. Metaphase II D. Anaphase II
36. When does crossing over occur during meiosis?
 A. Prophase I B. Metaphase I C. Prophase II D. Metaphase II
 E. A & B

37. Which of the following statements (A-D) about cyclins and associated molecules is FALSE?
- A. Cyclin levels are variable throughout the cell cycle
 - B. Cyclin levels are highest at the end of the S stage of the cell cycle
 - C. Cyclins and cyclin-dependent kinases (CDK's) combine to form maturation MPF complexes
 - D. MPF promotes mitosis and initiates processes to destroy cyclins
38. Which of the following structures would you not expect to find in a monocot?
- A. Vascular cambium
 - B. Apical meristem
 - C. Xylem
 - D. Endodermis
 - E. Leaves with parallel venation

Use the key below to answer questions 39 and 40

- I. Parenchyma
- II. Collenchyma
- III. Sclerenchyma
- IV. Vessels and tracheids
- V. Sieve tube elements and companion cells

39. How many of the above cell types function in supporting the cell?
- A. 1
 - B. 2
 - C. 3
 - D. 4
 - E. 5
40. How many of the above cell types are dead at functional maturity?
- A. 1
 - B. 2
 - C. 3
 - D. 4
 - E. 5
41. Where does meiosis take place in a fern?
- A. The ovule
 - B. The ovary
 - C. The egg sac
 - D. The sporangium
42. A fruit is a ripened _____
- A. Anther
 - B. Egg sac
 - C. Ovule
 - D. Ovary
 - E. Flower
43. Which of the following statements (A-D) about seed plants is FALSE?
- A. All seed plants have vascular tissue
 - B. All seed plants have ovules
 - C. Viable seeds consist of a seed coat, and embryo, and food for the embryo
 - D. Both gymnosperms and angiosperms exhibit double fertilization
 - E. All seed plants produce pollen
44. Which of the below statements is FALSE?
- A. Healthy arterial walls are thick and elastic
 - B. The greatest loss of blood pressure takes place in the arterioles
 - C. Gas exchange in the lungs take place in the alveolar capillaries
 - D. Blood pressure is greater in the venules than in the capillaries
 - E. Veins possess valves to prevent backflow
45. The pulmonary circuit is involved in oxygenating the blood while the systemic circuit is involved in transporting oxygenated blood to the body
- A. True
 - B. False

46. How is most of the oxygen transported in the blood?
 A. Bound to hemoglobin B. Dissolved in the plasma C. As H_2CO_3
 D. As HCO_3^- E. By the leucocytes
47. Where does most of the absorption of nutrients take place?
 A. The stomach B. The pancreas C. The small intestine
 D. The large intestine E. The rectum
48. What is the function of bile?
 A. To protect the stomach lining B. Emulsify fats
 C. To activate enzymes in the small intestine D. Starch digestino
49. Which of the following statements (A-D) about a cell-mediated immune response is FALSE?
 A. A macrophage engulfs a pathogen, becoming an antigen-presenting cell
 B. The antigen-presenting cell activates a virgin or memory helper T cell
 C. The virgin or memory cytotoxic T Cell becomes activated by direct contact with the pathogen
 D. The activated helper T Cell further activates the cytotoxic T cell
50. Immune response to repeated exposure to a pathogen is faster due to the development of memory Helper T, Cytotoc T, and B-Cells.
 A. True B. False
51. Which of the following is NOT a function of the excretory system?
 A. Production of salts B. Water conservation
 C. Osmoregulation D. Removal of nitrogenous wastes
 E. Regulation of blood volume and concentration
52. High blood pressure in the glomerulus forces plasma and small dissolved particles out of the capillary bed. This filtrate is captured by the Bowman's Capsule.
 A. True B. False
53. An action potential is all or none
 A. True B. False
54. Myelinated neurons:
 A. Have no synapses
 B. Are relatively rare in the nervous system
 C. Have Schwann cells associated with the cell body
 D. Help speed up the rate of travel of an impulse down a cell
 E. None of the above
55. Where did Mike work when he was in high school and an undergrad?
 A. McDonalds B. Pizza Hut C. The police department
 D. An escort service E. IBM0