BIOLOGY 311C - Brand
Spring 2007

NAME (printed very legibly) ___**Key**_____ UT-EID _____

EXAMINATION I

Before beginning, check to be sure that this exam contains 7 pages (including front and back) numbered consecutively, and that you have been provided with a clean Answer Sheet. Then immediately print your name and UT-EID legibly at the top of this page. Also print and bubble in your name and your UT-EID (not your social security number) on the front of the Answer Sheet in the spaces provided. The first 37 questions are "multiple choice", with only one correct answer. Mark the letter corresponding to the correct answer to each of these questions in the appropriate location on the Answer Sheet, using a No. 2 pencil. Write answers to Questions 38 – 41 directly on this exam, in the spaces provided with the questions. Write in complete sentences if an explanation or a description is required. Print neatly if your handwriting is likely to be difficult to read. Turn in both this exam and the Answer Sheet after checking to be sure that your name is clearly written in both places and all questions have been answered in the appropriate locations. You must turn in you exam on or before 9:50 a.m.

1. A chemical species that carries one or more negative electrical charges is called a(n):
   a. anion.
   b. cation.
   c. isotope.
   d. isomer.

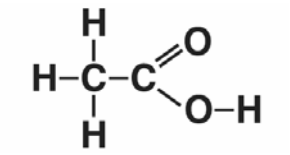
2. A single unit of an element is called a(n):
   a. proton.
   b. ion.
   c. molecule.
   d. atom.

3. A chemical reaction involves the loss, gain or re-distribution of one or more:
   a. atoms.
   b. molecules.
   c. protons.
   d. electrons.

4. How many covalent bonds occur in the molecule whose chemical formula is CH_4?
   a. 2
   b. 3
   c. 4
   d. 5

5. Which one of the following is considered to be an organic compound?
   a. H_2O
   b. $CH_3\text{-}OH$
   c. HCO_3^-
   d. NH_3

6. Which one of the following functional groups appears in the molecule whose chemical structure is shown at right?



   a. Alcohol
   b. Aldehyde
   c. Ketone
   d. Carboxylic acid

7. The typical bond length of a covalent bond (in units of Å) is:
   a. 1.
   b. 3.
   c. 40.
   d. 109.

8. Which one of the following is most important in the movement of human cells by lamellipodia?
   a. Microtubules
   b. Microfilaments
   c. Intermediate filaments
   d. Pili

9. Collagen fibers, proteoglycans and fibronectin are components of an animal cell:
   a. glycocalyx.
   b. centrosome.
   c. lysosome.
   d. flagellum.

10. The black-box properties of living cells that were considered in this course are:
   a. unique to individual living cells.
   b. also properties of isolated membrane-bounded organelles.
   c. still expressed in a cell after it dies, as long the components of the cell remain together.
   d. also properties of entire stable ecosystems.

11. Experiments of Robert Hooke, Antonin van Leeuwenhoek and Louis Pasteur led directly to the modern concept of:
   a. the cell doctrine.
   b. the central dogma of molecular biology.
   c. the black-box properties of living cells.
   d. the 5-kingdom partitioning of all living organisms.

12. The outer boundary of the living substance of the cell is considered to be the:
   a. cell wall.
   b. plasma membrane.
   c. sheath or capsule.
   d. glycocalyx.

13. The water-insoluble organic molecules of cells are called:
    a. carbohydrates.
    b. lipids.
    c. nucleic acids.
    d. proteins.

14. A chemical process in which two hydrogen atoms are lost from a reduced organic molecule is called a(n)
    a. isomerization reaction.
    b. ionization reaction.
    c. reduction reaction.
    d. oxidation reaction.

15. Which one of the following lengths is shortest?
    a. 1,000 Å
    b. 10 nm
    c. 0.1 μm
    d. 0.001 mm

16. Living cells that are spherical in shape generally aren't larger that 100 μm in diameter. Which one of the following is not a change that would allow a cell to become larger in diameter?
    a. Expand the plasma membrane to make the cell very irregular in shape
    b. Place a large vacuole within the cell
    c. Change its shape to long and thin without changing its Surface Area/Volume ratio
    d. Decrease its rate of metabolism

17. How many of the five recognized kingdoms of living organisms are prokaryotic?
    a. 1
    b. 2
    c. 3
    d. 4

18. Which one of the following is not surrounded by a double-membrane envelope?
    a. Lysosome
    b. Proplastid
    c. Prokaryotic cell
    d. Nucleus

19. Which one of the following cultures is expected to consist of rod-shaped bacteria?
    a. *Staphylococcus aureus*
    b. *Diplococcus pneumoniae*
    c. *Streptobacillus moniformis*
    d. *Spirillum pleomorphum*

20. Quarum sensing is an example in bacteria of:
    a. differentiation into two different types of cells.
    b. communication among cells.
    c. production of plasmids in response to environmental extremes.
    d. production of a surrounding capsule when engulfed by a phagocytic (cell-eating) eukaryotic cell.

21. The intermembrane space (periplasmic space) of a prokaryotic cell is:
    a. the space between its envelope and an external sheath.
    b. a watery space within a bacterial flagellum.
    c. its cytoplasm.
    d. the space between its plasma membrane and an outer membrane.

22. Which of the following would be more likely to occur in a prokaryotic cell that performs respiration or photosynthesis than in a prokaryotic cell incapable of either of these processes?
    a. Plasmids
    b. A large number of pili
    c. Internal membranes
    d. Occlusions

23. Most prokaryotic cells range in size (diameter):
    a. from 1 to 5 nm.
    b. from 50 to 200 nm.
    c. from 0.5 to 5 μm.
    d. from 5 to 100 μm.

24. Which one of the following is not a membrane-bounded organelle?
    a. Peroxysome
    b. 80S ribosome
    c. Food vacuole
    d. Smooth endoplasmic reticulum

25. Which one of the following is not a part of the endomembrane system?
    a. Mitochondrion
    b. Nuclear envelope
    c. Plasma membrane
    d. Golgi body

26. Which one of the following is continuous with (directly connected to) the nuclear outer membrane?
    a. Golgi cisternae
    b. Lamins
    c. Rough endoplasmic reticulum
    d. Peroxysomes

27. The primary function of mitochondria is:
    a. respiration.
    b. starch synthesis.
    c. detoxification of benzene rings.
    d. intracellular digestion.

28. Toxic H_2O_2 is destroyed in eukaryotic cells primarily within:
    a. lysosomes.
    b. mitochondria.
    c. the nucleoplasm.
    d. peroxysomes.

29. Bacteria that are engulfed by animal cells are digested within:
    a. mitochondria.
    b. lysosomes.
    c. smooth endoplasmic reticulum.
    d. plastids.

30. A spherical eukaryotic organelle surrounded by a single membrane that does not perform many metabolic functions is called a:
    a. vacuole.
    b. cisternae.
    c. cristae.
    d. thylakoid.

31. Some ribosomes are bound to the surface of endoplasm reticulum (e.r.) in order to:
    a. transport the ribosomes to golgi bodies.
    b. insert proteins into the lumen of the e.r.
    c. cause their two subunits to separate.
    d. convert them from 80S to 70S ribosomes.

32. The processes of packing luminal proteins into forms suitable for their final destination and sorting of various compounds so they can be targeted to the correct final destination occur in eukaryotic cells within:
    a. golgi.
    b. lysosomes.
    c. the inner nuclear membrane.
    d. rough endoplasmic reticulum.

33. Which one of the following is not true of cilia?
    a. They contain microtubules.
    b. They contain microfilaments.
    c. They contain motor molecules.
    d. They are surrounded by plasma membrane.

34. Muscle movement in animals and cyclosis in plant cells is due to the function of:
    a. actin filaments.
    b. beta tubulin.
    c. keratin and lamins.
    d. chromatin fibrils.

35. The diameter of a microtubule is:
    a. 2.5 Å.
    b. 25 nm.
    c. 2.5 µm.
    d. 25 µm.

36. Which one of the following is virtually identical to a basal body of a eukaryotic cell?
    a. A flagellum
    b. A cilium
    c.. A spindle apparatus
    d. A centriole

37. According to the endosymbiont theory, which one of the following organelles first appeared in eukaryotic cells by the uptake and assimilation of a prokaryotic cell?
    a. A lysosome
    b. A golgi body
    c. A mitochondrion
    d. A central vacuole

38. List the three distinct components into which a eukaryotic cell may be divided as described in BIO 311C.

    a. ___**Plasma membrane**____

    b. ___**Cytoplasm** _____

    c. ___**Nucleus**_____

39. Fill in the remainder to the table below:

Atom	Chemical symbol	Covalency	Electronegative?
Hydrogen	**H**	**1**	**No**
Oxygen	**O**	2	**Yes**
Carbon	C	**4**	**No**
Nitrogen	N	**3**	Yes
Phosphorus	P	**5**	**No**
Sulfur	S	**2**	No

40. For each of the statements listed below, select the best answer from the list at right and place the corresponding letter in the space provided.

A. Not true of either prokaryotic or eukaryotic cells

B. True of virtually all prokaryotic cells, but not generally true of eukaryotic cells

C. True of virtually all eukaryotic cells, but not generally true of prokaryotic cells

D. Generally true of all prokaryotic and eukaryotic cells

a. ___**D**____ Contains a plasma membrane

b. ___**D**____ Contains occlusions

c. ___**C**____ Contains 80S ribosomes

d. ___**D**____ Contains 70S ribosomes

e. ___**C**____ Contains intermediate filaments

f. ___**B**____ Contains plasmids

g. ___**A**____ Contents are maintained at a state of equilibrium

h. ___**B**____ Surrounding envelope includes two membranes

i. ___**C**____ Contains chromatin with histone proteins

41. For each of the statements listed below, select the best answer from the list at right and place the corresponding letter in the space provided.

A. True of virtually all animal cells, but not generally true of plant cells

B. True of virtually all plant cells, but not generally true of animal cells

C. Generally true of both plant cells and animal cells

a. ___**C**____ Contains golgi bodies

b. ___**A**____ Contains centrioles

c. ___**C**____ Contains mitochondria

d. ___**B**____ Contains proplastids

e. ___**B**____ Contains a central vacuole

f. ___**B**____ Contains plasmodesmata