FINAL EXAMINATION

ATTEMPT ALL THE QUESTIONS

SECTION A (40 MARKS)

1. **Carrier molecules that bring materials into cells are**
   a. Lipids
   b. Proteins
   c. Glycogen
   d. Phospholipid
2. **Arrange the following compounds in order of increasing membrane permeability: N_2, water, glucose and RNA.**
   a. RNA>glucose>water>N_2
   b. N_2>water>glucose>RNA
   c. Water>N_2>glucose>RNA
   d. N_2>water>RNA>glucose
3. **The rate of diffusion across the cell membrane is affected by the**
   a. temperature and pinocytosis.
   b. temperature and size of the molecule.
   c. membrane structure and phagocytosis.
   d. shape of glycolipids and glycoproteins.
4. **How many of the following factors would affect the permeability of the cell membrane? • Size of molecules • Lipid solubility of molecules •Presence of transport channels • Presence of ATP inside the cell.**
   a. One.
   b. Two.
   c. Three.
   d. Four.

5. **Which of the following aids the movement of glucose across a cell membrane?**
   a. Protein.
   b. Phosphate.
   c. Glycolipid.
   d. Cholesterol.
6. **In the parietal cells of the stomach, the uptake of chloride ions is coupled to the transport of bicarbonate ions out of the cell. This type of active transport system is called,**
   a. Uniprot
   b. Symprot
   c. Antiprot
7. **Which of the following conditions is required for diffusion to occur?**
   a. ATP energy.
   b. A living cell.
   c. A concentration difference.
   d. A selectively-permeable membrane.
8. **Frog eggs placed in an isotonic solution will**
   a. burst.
   b. shrink.
   c. remain the same.
   d. increase in volume.
9. **When put in a hypotonic environment, an animal cell will**
   a. swell.
   b. shrink.
   c. secrete enzymes.
   d. remain unchanged.
10. **Which of the following conditions would cause red blood cells to burst?**
    a. pH of 7.5.
    b. Temperature of 3°C.
    c. Being placed in distilled water.
    d. Being placed in an 11% salt solution.

11. In an experiment, frog's eggs were placed in a salt solution. After several hours their mass increased significantly. We can therefore conclude that, compared to the frog's eggs, the solution was

a. isotonic.
b. saturated.
c. hypotonic.
d. hypertonic.

12. Which of the following moves material against a concentration gradient?

a. osmosis
b. diffusion
c. active transport
d. facilitated transport

13. Which of the following processes moves molecules using cellular energy?

a. Osmosis.
b. Diffusion.
c. Pinocytosis.
d. Facilitated transport.

14. Which of the following processes would be directly affected by a lack of cellular ATP?

a. Osmosis.
b. Diffusion.
c. Active transport.
d. Facilitated transport.

15. Which of the following will be affected directly if the mitochondria in a cell are not functioning properly?

a. Absorption of alcohol by the cell.
b. The movement of water into and out of the cell.
c. The movement of oxygen across the cell membrane.
d. The movement of sugar from a low to a high concentration.

16. The cell process which uses ATP to bring substances into the cell is

a. Osmosis.
b. Diffusion.
c. Active transport.
d. Facilitated transport.

17. A bacterium is living in a pond where the concentration of sodium ions is 0.005mM. This ion is found in the bacterial cytoplasm at a concentration 0.10 mM. Therefore the sodium ion is probably entering by:

a. Simple diffusion
b. Facilitated diffusion
c. Passive transport
d. Active transport

18. What are the two factors that are responsible for diffusion rate?

19. What are the membrane potentials of living cells?

20. How the opening and closing of ion channels occur in a cell?

SECTION B (20 MARKS)

1. Which of the following uses energy to transport molecules or ions against their concentration gradient?

a. Voltage-gated Na+ channel
b. Acetylcholine receptor
c. Glucose transporter
d. ATP-ADP transporter
e. Na+/K+-ATPase

2. **A membrane-spanning transporter protein that is also characterized as a "symporter" would be involved in which one of the following transport processes?**

a. Simple transport (e.g., lactose via Lac permease)

b. Simultaneous transport of one type of molecule into the cell and a different molecule out of the cell (e.g., Na+ "pump" to move Na+ out of the cell)

c. Transport of potassium ions into the cell without any other ion or molecule being transported in any direction

d. Unidirectional transport into the cell of only one type of molecule (found in very low concentration in the periplasm) using the ATP-driven ABC translocation system

3. **The sodium-potassium pump passes**

a. more Na+ out than K+ in

b. K+ out and Na+ in on a one-for-one basis

c. Na+ out and K+ in on a one-for-one basis

d. K+ and Na+ in the same direction

4. **The sodium-potassium pump moves sodium and potassium ions against the concentration gradient.**

a. True

b. False

5. **The Na^+-K^+ pump consumes a third of the total ATP supply of a typical animal cell and is responsible for maintaining the high concentration of K^+ inside cells, for controlling cell volume, and for driving the uptake of sugars and amino acids in the intestine and kidneys.**

a. True

b. False

6. **The energy needed to power the sodium-potassium pump is provided by the**

a. Binding of ATP to the pump

b. Transport of ATP by the pump.

c. Splitting of ATP.

d. Formation of ATP.

7. **Which of the following moves Ca^{2+} back into the tubules of the SR after a contraction?**

a. The ATP-dependent H^+ pump

b. The ATP-dependent myosin pump

c. Simple diffusion

d. The ATP-dependent Na^+/K^+ pump

e. The ATP-dependent Na^+/K^+ pump

f. The ATP-dependent calcium pump

8. **SERCS pumps actively transport calcium:**

a. From ER to cytosol

b. From cytosol to ER

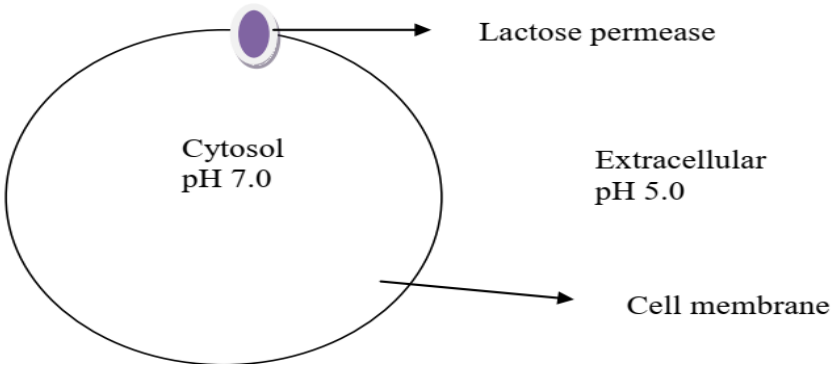
c. From extracellular space to the cytosol

d. From the cytosol to the extracellular space

e. From the mitochondria to the cytosol

9. **In each cycle, the Na^+-K^+ pump transfers ____K^+ ions in the cell and ____ Na^+ out of the cell.**

10. **Bacterial lactose permease is a symporter of lactose and H+. When the lactose concentrations in the cytosol and in the extracellular space are identical but the pH's in the two locations are different as indicated below, which direction would lactose be transported? Explain briefly why you think that way.**



SECTION C (20 MARKS)

1. Which pump is present in lysosomal membrane?
   a. P-class pump
   b. ABC transporter
   c. V-class pump
   d. F-class pump
2. The pH of the lysosomal compartment is
   a. 4
   b. 4.6
   c. 5
   d. 5.6
3. Which of the following correctly matches an organelle with its function?
   a. mitochondrion….photosynthesis
   b. Nucleus….cellular respiration
   c. Ribosome….manufacture of lipids
   d. Lysosome….movement
   e. Central vacuole….storage
4. Lysosomes are reservoirs of
   a. Hydrolytic enzymes
   b. Fat
   c. Secretory glycoproteins
   d. RNA
5. A function of lysosomes is
   a. Syntheisis
   b. Hydrolysis
   c. Replication
   d. Respiration

6. For digestion to occur in a vacuole, the vacuole must first fuse with
   a. Nucleus
   b. Ribosome
   c. Lysosome
   d. Golgi bodies
7. Lysosomes can be expected to be present in large numbers in cells which
   a. Have cilia.
   b. Produce centrioles.
   c. Are actively dividing.
   d. Carry out phagocytosis.
8. For digestion to occur in a vacuole, the vacuole must first fuse with
   a. Nucleus
   b. Ribosome
   c. Lysosome
   d. Golgi body
9. The proton gradient between the lysosomal lumen (pH ≈4.5–5.0) and the cytosol (pH ≈7.0) depends on ATP production by the cell.
   a. True
   b. False
10. What is the function of permanent vacuole?
    a. Supports and protects the cell
    b. Controls what enters and leaves the cell
    c. Controls the cell
    d. Stores water and mineral ions
    e. Stores water and mineral ions

SECTION D (20 MARKS)

QUESTION 1.

What are transporters and cotransporters?

QUESTION 2.

Differentiate between symport and antiport.

QUESTION 3.

Describe the mechanism of accumulation of metabolites and ions in plant vacuoles.

QUESTION 4.

What are the functions of cotransporters?

QUESTION 5.

What are the functions associated with cytoplasmic membrane which has role in transport mechanism of cell?

QUESTION 6.

What are the composition of outer membrane and its functions that has role in transport mechanism of cell?

QUESTION 7.

What is the classification of transport mechanism in the cells? Explain with example.

QUESTION 8.

Explain the transport mechanism of phosphate in the cell.

QUESTION 9.

What is transcytosis? Explain with an example.

QUESTION 10.

What are the two types of exocytosis? Explain with a schematic diagram.

END OF EXAM. GOOD LUCK