1. The reversible protein phosphorylation controls the activity of many different types of protein in eucaryotic cells. Please describe the underlining mechanism. (9%)

2. Please define apoptosis and necrosis, and describe the role of Bcl-2 family in regulating cell death. (10%)

3. Describe in detail the statement: Signal peptides are essential for transport of newly synthesized secretory proteins out of the cell. (8%)

4. Please describe the biological function of microtubules in relative to intracellular transport or organelles movement. (9%)

5. What is meant by down-regulation and up-regulation of receptors? How are each of these achieved by the cell? What is the effect of each of these events on hormone signaling? (9%)

6. The kinases of cell-cycle control system are known as cyclin-dependent protein kinases or Cdks. Please describe briefly that distinct Cdks associate with different cyclins to trigger the events of the cell cycle. (9%)

7. A living cell is a membrane-bound unit filled with a concentrated solution of chemicals. Please use mammalian plasma membrane as an example to discuss the structure characteristics and functions of cell membranes. (9%)

8. Please describe the difference between the following methods and what purpose of study can these methods achieve? (16%)　(a) In situ hybridization, (b) RT-PCR, (c) Southern blot, and (d) Immunocytochemistry.

9. Explain the following terminology: (21%)
   A) protein domain
   B) oxidative phosphorylation
   C) membrane potential
   D) G-protein-linked receptor
   E) second messenger
   F) tumor-suppressor genes
   G) actin filament