

- (1) What are in vivo and in vitro studies in physiological aspect? Most of the modern physiological scientists employ cell cultures, so called in vitro models, for doing experiments. Why? (10%)
- (2) Please define homeostasis and hemostasis. Which of the following substances or items is (are) under homeostatic control? (15%)
A. BUN (blood urea nitrogen).
B. Creatinine.
C. Blood sugar.
D. Serum album.
E. Blood pressure.
- (3) Apoptosis is also called programmed cell death or physiological cell death. What are the hallmarks of apoptosis? Under what physiological conditions do cells undergo apoptosis? (15%)
- (4) Hypertension is a very common disease for human being. Renin-angiotensin-aldosterone system (RAAS) plays very important roles in regulation of salt and water balance as well as the regulation of blood pressure. Please describe what RAAS is, how it is involved in blood pressure regulation and finally what strategy we can use to lower blood pressure. (15%)
- (5) Diabetes Mellitus (DM) is another common human disease. Hyperglycemia causes a lot of problems leading to the damage of lense, nerve, cardiovascular system and kidney. Controlling blood sugar is the most important strategy for treating DM pateints. Please describe how blood sugar is regulated in normal person and what are the possible defects which cause hyperglycemia in DM patients. (15%)
- (6) Choose only one of the following questions to answer: (15%)
(A) Please describe the electrical activity of the cardiac muscle and the underlying mechanisms by addressing the involvement of specific ion conductance.
(B) Please describe the changes of pressure in aorta, left atrium and left ventricle during the cardiac cycle. You are allowed to draw a figure to answer this question.
- (7) What are the know signal transduction pathways for steroid hormones, peptide hormones, neurotransmitters, growth factors, or cytokines? Please select two of the above categories. (15%)