問答題(本部份共 66 分):

1.Please describe the sequence of events involving in the excitation and contraction of a skeletal muscle following the arrival of an action potential in the nerve terminal on this muscle's neuromuscular junction. (7%)

2.How is the tubular maximum for glucose reabsorption of an animal's secretory organ determined experimentally? (7%)

3.Please describe the changes in cation flows across the plasma membrane at a particular point of a squid giant axon during an action potential. (6%)

4.Please describe the spinal cord circuitry responsible for the stretch reflex. (6%)

5.Please describe the receptive fields of the retinal ganalion cells in the cat retina and how these receptive fields are determined experimentally. (7%)

6.某人在劇烈運動後，因極度口渴，在短時間內喝下 1000CC 剛開瓶之汽水，請問

a. 對於血液中運送氧有何影響？

b. 對於血液 pH 值可能有何影響？

c. 在肺泡內 CO_2 之交換有何影響？

(12%)

7. 同上題，但某人喝用整株植物打汁而成的生機飲料(假設富含細胞內液)，請問

a. 此人細胞外液何種離子激增？

b. 身體如何因應此種變化而加以調節？

(10%)

8. 某病人因急救之需要，醫生把高濃度葡萄糖液由靜脈注入病人體內，請問此病人身體細胞內、外液及全身體液在注入後隨時間分別有何變化？

(11%)

選擇題(單選，每題 2 分，本部份共 34 分):

1. Most of the venous CO_2 is in the form of
   (1) Carbonate
   (2) Carbonic acid
   (3) Bicarbonate
   (4) Dissolved CO_2
   (5) Carbamino compounds

2. Blood flow is regulated largely by local metabolic effect in
   (1) Brain
   (2) Muscle
   (3) Lung
   (4) Heart
   (5) Kidney

3. Autoregulation of blood flow involves the maintenance of a relatively constant
   (1) Blood pressure during variation of blood flow
   (2) Resistance in the face of changing blood pressure
   (3) Blood flow over a range of blood pressure
   (4) Blood flow while resistance is changing
   (5) Heart rate in the face of changing of blood pressure

4. Which of the following does NOT occur during maximal exercise?
   (1) There is a net increase in total vascular volume
   (2) Cardiac output increases less than respiratory minute volume
   (3) Pulmonary diffusion capacity increase
   (4) Expiration becomes an active event
   (5) Body temperature rises

5. In contrast to the systemic circulation, the pulmonary circulation is characterized by
   (1) Low mean pressure
   (2) High resistance
   (3) Relative small pulse pressure
   (4) Large volume flow per minute
   (5) Absence of sympathetic control

6. Metabolic acidosis may be caused by
   (1) Loss of CO_2 by increased ventilation
   (2) Retention of CO_2 due to respiratory obstruction
   (3) Persisting vomiting
   (4) Absorption of excessive amount of bicarbonate
   (5) None of above

7. Which of the following changes in plasma concentrations are characteristic of compensatory respiratory acidosis ?
   (1) Increase in pH
   (2) Decrease in pCO_2
   (3) Increase in sodium chloride
   (4) Increase in sodium bicarbonate
   (5) Decrease in sodium bicarbonate

8. Gallbladder function includes all of the following EXCEPT
   (1) Equalization of pressure in bile duct system
   (2) Reduction of alkalinity
   (3) Bile secretion
   (4) Concentration of bile fluid
   (5) Fluid reabsorption

9. Pressure in the main pulmonary artery
   (1) Will approximately double if cardiac output doubles
   (2) Will approximately double if one lung is removed
   (3) Is lowed by a local vasodilator effect of alveolar hypoxia
   (4) Is always high enough to perfuse the uppermost parts of a human lung

10. Secretion of aldosterone is controlled by plasma volume and
   (1) Angiotensin II
   (2) Plasma chloride concentration
   (3) Plasma bicarbonate
   (4) ADH
   (5) Plasma pH

11. Man is unable to digest dietary
   (1) Glycogen
   (2) Dextrin
   (3) Saccharose
   (4) Cellulose
   (5) Glucose

12. Gastric secretion is
(1) Increased by stomach distention
(2) Stimulated by an increase in phonic activity
(3) Stimulated by norepinephrine
(4) Inhibited by curare
(5) Not affected by the presence of food in the stomach

13. The process of body aging may be caused by
(1) Los of proliferative capacity within a finite life time
(2) Cellular wear and tear
(3) Autointoxication
(4) Genetic determination with accumulation of somatic mutations
(5) All of above

14. During fever
(1) The body loses its thermoregulatory capabilities
(2) Body temperature continues to rise
(3) Neurocontrol of peripheral vasculature is lost
(4) The hypothalamus has reset the temperature at a higher level
(5) There is always a infection

15. An important secondary pacemaker in the heart is
(1) SA node
(2) Bundle of Kent
(3) N layer of the AV node
(4) The Purkinje network
(5) Left atrial

16. If arterial capacitance remains constant, increasing heart rate should cause pulse pressure to
(1) Increase
(2) Decrease
(3) Remain unchanged
(4) Decrease then increase
(5) Increase then decrease

17. A sudden fall in right atrial pressure will cause an immediate
(1) Increase in systemic arterial pressure
(2) Increase in the pressure within the thorax
(3) Decrease in cardiac output
(4) Increase in the heart rate
(5) Increase in cardiac output