

Part I : 共四大題 50%

一、請說明人體如何進行下列感覺機能。(每小題 5%，共 20%)

(A)聽覺 (B)視覺 (C)嗅覺 (D)痛覺

二、請比較心肌、骨骼肌和平滑肌的異同點。(10%)

三、請說明「腎上腺(adrenal gland)」的生理意義。(10%)

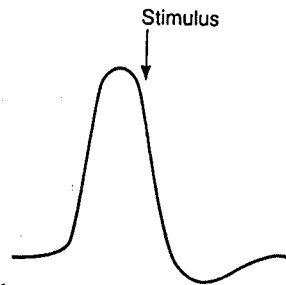
四、最近，新聞常報導有人吸取「笑氣」或「P2 氣體」來當為取樂的刺激物。請問這些氣體是如何進到腦部呢？請由呼吸生理學的观点來說明。(10%)

(背面仍有題目,請繼續作答)

Part II : 選擇題 50% (共 25 題, 每題 2 分)

1. A muscle cell has an intracellular $[Na^+]$ of 14 mM and an extracellular $[Na^+]$ of 140 mM. Assuming that $2.3RT/F = 60$ mV, what would the membrane potential be if the muscle cell membrane were permeable only to Na^+ ?
(A) +80 mV
(B) +60 mV
(C) 0 mV
(D) -60 mV
(E) -80 mV

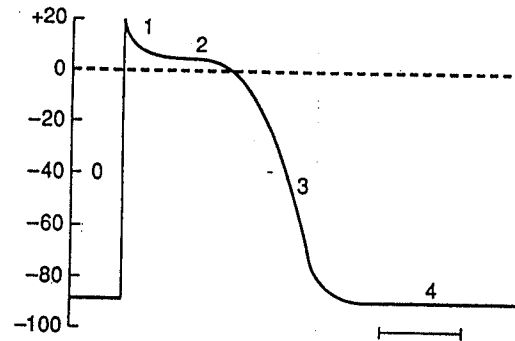
2. During a nerve action potential, a stimulus is delivered as indicated by the arrow shown in the following figure. In response to the stimulus, a second action



- (A) of smaller magnitude will occur
(B) of normal magnitude will occur
(C) will not occur
(D) will occur, but it will not have an overshoot
(E) of normal magnitude will occur, but it will be delayed in time
3. Which of the following is the correct temporal sequence for events at the neuromuscular junction?
(A) Uptake of Ca^{2+} into the presynaptic terminal; release of ACh; depolarization of the muscle end plate
(B) Action potential in the motor nerve; depolarization of the muscle end plate; uptake of Ca^{2+} into the presynaptic nerve terminal
(C) Release of ACh; action potential in the motor nerve; action potential in the muscle
(D) Uptake of Ca^{2+} into the motor end plate; action potential in the motor end plate; action potential in the muscle
(E) Release of ACh; action potential in the muscle end plate; action potential in the muscle

4. The rate of conduction of action potentials along a nerve will be increased by
- (A) stimulating the $\text{Na}^+\text{-K}^+$ pump
 - (B) inhibiting the $\text{Na}^+\text{-K}^+$ pump
 - (C) myelinating the nerve
 - (D) decreasing the diameter of the nerve
 - (E) none of above
5. Which of the following has a much lower concentration in cerebrospinal fluid than in cerebral capillary blood?
- (A) Na^+
 - (B) K^+
 - (C) Osmolarity
 - (D) Protein
 - (E) Mg^{2+}
6. Which of the following is a property of C fibers?
- (A) Are afferent nerves from muscle spindles
 - (B) Are afferent nerves from Golgi tendon organs
 - (C) Have the slowest conduction velocity of any nerve fiber type
 - (D) Are preganglionic autonomic fibers
 - (E) Have the largest diameter of any nerve fiber type
7. When a person moves from a supine position to a standing position, which of the following compensatory changes occurs?
- (A) Decreased heart rate
 - (B) Increased contractility
 - (C) Increased venous return
 - (D) Decreased cardiac output
 - (E) Increased PR intervals
8. Cardiac output of the right heart is what percentage of that of the left heart?
- (A) 25%
 - (B) 50%
 - (C) 75%
 - (D) 100%
 - (E) 125%

The diagram applies to Questions 9-12



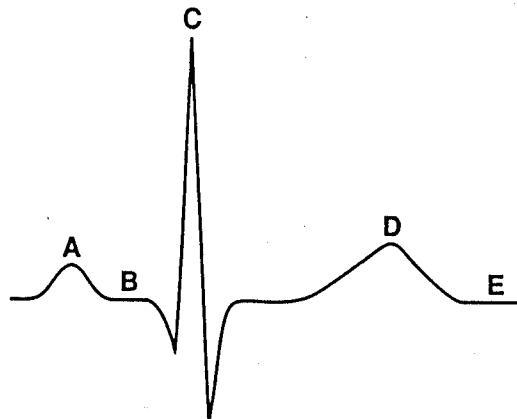
9. Phase of the ventricular action potential in which the membrane potential is closest to the K^+ equilibrium potential
- (A) Phase 0
(B) Phase 1
(C) Phase 2
(D) Phase 3
(E) Phase 4
10. Phase of the ventricular action potential that has the highest conductance to Ca^{2+}
- (A) Phase 0
(B) Phase 1
(C) Phase 2
(D) Phase 3
(E) Phase 4
11. Phase of the ventricular action potential that coincides with diastole
- (A) Phase 0
(B) Phase 1
(C) Phase 2
(D) Phase 3
(E) Phase 4
12. Phase of the ventricular action potential that has the highest conductance to Na^+
- (A) Phase 0
(B) Phase 1
(C) Phase 2
(D) Phase 3
(E) Phase 4

13. Compared with the systemic circulation, the pulmonary circulation has a
- (A) higher flow
 - (B) lower resistance
 - (C) higher arterial pressure
 - (D) higher capillary pressure
 - (E) higher cardiac output
14. Which of the following would produce an increase in reabsorption of isosmotic fluid in the proximal tubule?
- (A) Oxygen deprivation
 - (B) Increased peritubular capillary hydrostatic pressure
 - (C) Decreased peritubular capillary protein concentration
 - (D) Increased filtration fraction
 - (E) ECF volume expansion
15. Which of the following causes hyperkalemia?
- (A) Exercise
 - (B) Alkalosis
 - (C) Insulin injection
 - (D) Decreased serum osmolarity
 - (E) Treatment with β -adrenergic agonist
16. All of the following are causes of metabolic acidosis EXCEPT
- (A) diarrhea
 - (B) hyperaldosteronism
 - (C) treatment with acetazolamide
 - (D) ethylene glycol ingestion
 - (E) chronic renal failure
17. When parietal cells are stimulated, they secrete
- (A) HCl and pepsinogen
 - (B) HCl and HCO_3^-
 - (C) HCO_3^- and intrinsic factor
 - (D) HCl and intrinsic factor
 - (E) Mucus and pepsinogen

18. Which of the following is NOT derived from proopiomelanocortin (POMC)?
- (A) ACTH
 - (B) FSH
 - (C) β -lipotropin
 - (D) α -lipotropin
 - (E) β -endorphin
19. All of the following inhibit secretion of growth hormone by the anterior lobe of the pituitary gland EXCEPT
- (A) sleep
 - (B) somatostatin
 - (C) obesity
 - (D) somatomedins
 - (E) growth hormone
20. All of the following increase secretion of oxytocin EXCEPT
- (A) orgasm
 - (B) suckling
 - (C) dilation of the cervix
 - (D) sight of the infant
 - (E) increased serum osmolarity

Question 21-25

Match each numbered phenomenon below with the correct lettered point on the ECG.



21. The atria are contracting
22. Both the atria and the ventricles are completely repolarized
23. The mitral valve closes
24. Aortic pressure is at its lowest value
25. Decreased duration of this portion of the ECG causes a decrease in pulse pressure