

考試科目	生理學	所別	神經科學研究所	考試時間	3月7日(日) 第三節
------	-----	----	---------	------	-------------

選擇題 (每題 2 分：共 20 題)

1. Regarding secondary active transport:

- (A) ATP directly consumed
- (B) use energy of ion gradient
- (C) solute moves follow its concentration gradient
- (D) all of above

2. common mechanism(s) by which stimulation of a cell leads to an increase in cytosolic Ca^{2+} concentration:

- (A) plasma membrane calcium channels open
- (B) calcium is restored by endoplasmic reticulum
- (C) active calcium transport out of the cell is activated by a second messenger
- (D) all of above

3. Which one of the following is NOT true about cells generating action potential?

- (A) cells are bad wires,
- (B) cells use electrons to conduct action potential
- (C) cells are not well insulated
- (D) not all cells can generate action potential

4. main factor(s) contribute to the maintenance of membrane potential

- (A) Ion channels
- (B) Ion pumps
- (C) Intracellular proteins
- (D) all of above

5. The ____ coordinates digestion, secretion, and motility to optimize nutrient absorption. Its activity is modified by information from the ____ and from local chemical and mechanical sensors.

- (A) enteric nervous system, CNS
- (B) CNS, enteric nervous system
- (C) CNS, spinal Cord
- (D) spinal cord, enteric nervous system

6. The swallowing reflex is coordinated by the ____, which stimulates the appropriate sequence of contraction and relaxation in the participating skeletal muscle, sphincters, and smooth muscle groups

- (A) pons
- (B) midbrain
- (C) medulla oblongata
- (D) cerebellum

考試科目	生理學	所別	神經科學研究所	考試時間	3月7日(日)第三節
------	-----	----	---------	------	------------

7. _____ stimulation in liver will _____ glucose production and release

- (A) sympathetic, have no effect on
- (B) parasympathetic, increase
- (C) sympathetic, decrease
- (D) sympathetic, increase

8. Glycolysis catabolizes primarily glucose. It consists of 10 enzymatic reactions that convert a _____-carbon molecule of glucose into two _____ carbon molecules. A net gain of _____ and 4 atoms of hydrogen

- (A) 5, 2, 36ATP
- (B) 6, 1, 34ATP
- (C) 5, 3, 1ATP
- (D) 6, 3, 2ATP

9. Which one of the following is NOT involved in the protein metabolism?

- (A) glycolysis
- (B) krebs cycle
- (C) oxidative phosphorylation
- (D) all of above

10. During the rising phase of the action potential, _____.

- (A) sodium channel open
- (B) sodium flow out of cells
- (C) potassium flow into the cells
- (D) A and B

11. Which of the following homeostatic control systems is most likely the result of learning? Its regulation anticipates changes in a regulated variable.

- (A) positive feedback
- (B) negative feedback
- (C) feedforward process
- (D) involuntary reflex

12. Which of the following components of electrocardiogram (ECG) appears as the result of the ventricular depolarization of heart?

- (A) P wave
- (B) QRS complex
- (C) T wave
- (D) S wave

考試科目	生理學	所別	神經科學研究所	考試時間	3月7日(日) 第三節
<p>13. In the case of arterial pressure dropped during hemorrhage, which of the following reactions relevant to arterial baroreceptor reflex is <u>true</u>?</p>					
<p>(A) arterial baroreceptor firing decreased; sympathetic discharge of heart increased (B) arterial baroreceptor firing decreased; sympathetic discharge of heart decreased (C) arterial baroreceptor firing increased; sympathetic discharge of heart increased (D) arterial baroreceptor firing increased; sympathetic discharge of heart decreased</p>					
<p>14. In a typical ventricular myocardial cell action potential, right after the depolarization, the membrane remains depolarized at a plateau of about 0 mV for approximately 250 msec. Which of the following mechanisms is involved in this process?</p>					
<p>(A) increase of the membrane permeability to sodium ion (B) increase of the membrane permeability to potassium ion (C) increase of the membrane permeability to magnesium ion (D) increase of the membrane permeability to calcium ion</p>					
<p>15. Regarding to neural control of respiration, which of the following statements is NOT true?</p>					
<p>(A) Neuronal firing in the dorsal respiratory group of medulla increases primarily for inspiration. (B) The dorsal respiratory group of medulla is important for pacing the respiratory rhythm as called by the respiratory rhythm generator. (C) The pons can fine-tune or modulate the medullar respiratory control. (D) Ventilation is reflexively stimulated via the activation of peripheral chemoreceptors when arterial partial pressure of CO₂ increased.</p>					
<p>16. GABA : glutamate = _____ : _____</p>					
<p>(A) excitatory postsynaptic potential (EPSP) : inhibitory postsynaptic potential (IPSP) (B) inhibitory postsynaptic potential (IPSP) : excitatory postsynaptic potential (EPSP) (C) end-plate potential (EPP) : pacemaker potential (D) pacemaker potential : end-plate potential (EPP)</p>					
<p>17. Which of the following diseases is most related to hyper-activation of brain dopamine systems?</p>					
<p>(A) epilepsy (B) Alzheimer's disease (C) Parkinson's disease (D) Schizophrenia</p>					
<p>18. The postsynaptic receptor of neuromuscular junction is _____ type.</p>					
<p>(A) acetylcholine (Ach) muscarinic (B) acetylcholine (Ach) nicotinic (C) dopamine D1 (D) dopamine D2</p>					
備	註 試 題 隨 卷 繳 交				

考試科目	生理學	所別	神經科學研究所	考試時間	3月7日(日) 第三節
------	-----	----	---------	------	-------------

19. In contrast to action potential occurred in the neuron, which of the following statement is true for the graded potential?

- (A) The amplitude is activated in the fashion of "all-or-none".
- (B) Its initialization requires a current to pass over a threshold about 15 mV depolarized relative to the resting potential.
- (C) It has no refractory period.
- (D) It cannot be summed in the temporal or spatial fashion.

20. Which of the following measurements or instruments is NOT useful to examine brain activity?

- (A) sphygmomanometer
- (B) electroencephalogram (EEG)
- (C) functional magnetic resonance imaging (fMRI)
- (D) magnetoencephalography (MEG)

問答題 (每題 10 分：共 6 題)

1. 關於分子(molecules)在細胞膜(membranes)內外之移動，請回答下列問題：

- (A) 列出 3 類移動之方法
- (B) 每一類請舉一個例子
- (C) 每一類之移動之取決因素

2. 在壓力反應非常重要之"下視丘-腦下垂體-腎上腺"(HPA, Hypothalamus-pituitary-adrenal axis)：

- (A) 請陳述其調控方式
- (B) 在此三部位各列舉一與壓力有關之荷爾蒙

3. 你在政大後山找到兩群的鬼鼠分別居住在樟山寺及楓香步道附近。牠們的遺傳背景幾乎一樣，但是在行為上有很大的差異，一個是一夫一妻制，一個是一夫多妻制。研究後初步發現在兩群鬼鼠的腦中，有兩種神經傳導物質(A 及 B)其數量(number)及可在腦中結合之區域(binding location)均不同。請設計一套實驗來證明神經傳導物質 A 而非 B，及其結合之區域(binding location) 對於一夫一妻制的行為扮演重要角色。

4. 就解剖、神經化學、及生理功能的角度而言，試述交感神經系統與副交感神經系統的差別。

5. 試畫出一個人體的大腦，並標示出下列腦組織所在的位置；再就每一個腦組織敘述其神經生理功能。(1) prefrontal cortex, (2) basal ganglia, (3) amygdala, (4) pituitary gland, (5) hypothalamus, (6) cerebellum.。

6. 試述探測大腦組織對特定生理反應或行為功能的研究方法。(可舉實驗例子說明；研究方法的說明不侷限一種)