

國立中山大學 104 學年度碩士暨碩士專班招生考試試題

科目名稱：生理學【海資系碩士班甲組選考】

題號：452004

※本科目依簡章規定「不可以」使用計算機(混合題)

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第一部份單選擇(每題2分，答錯不倒扣)

- 1) Nitric oxide and epinephrine _____.
A) bind the same receptors
B) both cause a reduction in the blood levels of glucose
C) both function as neurotransmitters
D) both function as steroid hormones
- 2) During a stressful interval, _____.
A) adrenocorticotrophic hormone (ACTH) stimulates the adrenal cortex, and neurons of the sympathetic nervous system stimulate the adrenal medulla
B) the alpha cells of islets secrete insulin and simultaneously the beta cells of the islets secrete glucagon
C) the calcium levels in the blood are increased due to actions of two antagonistic hormones, epinephrine and norepinephrine
D) thyroid-stimulating hormaon (TSH) stimulates the adrenal cortex and medulla to secrete acetylcholine
- 3) Melatonin is secreted by the _____.
A) hypothalamus during the day
B) autonomic nervous system during the winter
C) posterior pituitary gland during the day
D) pineal gland during the night
- 4) The absorption of fats differs from that of carbohydrates in that _____.
A) most absorbed fat first enters the lymphatic system, whereas carbohydrates directly enter the blood
B) fat absorption primarily occurs in the stomach, whereas carbohydrates are absorbed from the small intestine
C) fats, but not carbohydrates, are digested by bacteria before absorption
D) carbohydrates need to be emulsified before they can be digested, whereas fats do not
- 5) Which pair correctly associates a physiological process with the appropriate vitamin?
A) synthesis of cell membranes – vitamin D
B) blood clotting – vitamin C
C) production of white blood cells – vitamin K
D) normal vision – vitamin A
- 6) In a well-fed human eating a Western diet, the richest source of stored chemical energy in the body is _____.
A) glucose in the blood B) fat in adipose tissue
C) protein in muscle cells D) glycogen in muscle cells
- 7) Which of the following mechanisms are used to regulate blood pressure in the closed circulatory system of vertebrates?
I) changing the force of heart contraction II) constricting and relaxing sphincters in the walls of arterioles III) adjusting the volume of blood contained in the veins
A) only I and II B) only II and III C) only I and III D) I, II, and III
- 8) If a molecule of carbon dioxide released into the blood in your left toe is exhaled from your nose, it must pass through all of the following EXCEPT _____.
A) the right atrium B) the trachea C) an alveolus D) the pulmonary vein
- 9) Countercurrent exchange in the fish gill helps to maximize _____.
A) osmosis B) blood pressure C) active transport D) diffusion
- 10) Compared to wetland mammals, water conservation in mammals of arid regions is enhanced by having more _____.

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- A) juxtamedullary nephrons B) podocytes C) urinary bladders D) ureters
- 11) After blood flow is artificially reduced at one kidney, you would expect that kidney to secrete more of the hormone known as _____.
A) renin B) angiotensinogen C) atrial natriuretic peptide D) antidiuretic hormone
- 12) Which of the following structures in females is analogous in function to the vas deferens in males?
A) uterus B) vagina C) oviduct D) urethra
- 13) The term applied to a morphogenetic process whereby cells extend themselves, making the mass of the cells narrower and wider, is _____.
A) induction B) bi-axial elongation C) elongational streaming D) convergent extension
- 14) The outer-to-inner sequence of tissue layers in a post-gastrulation vertebrate embryo is _____.
A) mesoderm → endoderm → ectoderm B) ectoderm → endoderm → mesoderm
C) endoderm → ectoderm → mesoderm D) ectoderm → mesoderm → endoderm
- 15) Excitatory postsynaptic potentials (EPSPs) produced nearly simultaneously by different synapses on the same postsynaptic neuron can also add together, creating _____.
A) a tetanus B) a temporal summation C) a spatial summation D) the refractory state
- 16) Which of the following ions is most likely to cross the plasma membrane of a resting neuron?
A) Ca^{2+} B) K^{+} C) Cl^{-} D) Na^{+}
- 17) The motor cortex is part of the _____.
A) cerebrum B) spinal cord C) medulla oblongata D) cerebellum
- 18) Stimuli alter the activity of excitable sensory cells and generate action potentials via _____.
A) integration B) transduction C) transmission D) amplification
- 19) A disease that destroys the adrenal cortex should lead to an increase in the plasma levels of _____.
A) adrenocorticotropic hormone (ACTH) B) glucocorticoid hormones C) acetylcholine D) epinephrine
- 20) Glucocorticoids do which of the following? 20) _____
A) increase insulin production B) promote the release of fatty acids C) promote the immune response D) increase blood glucose levels
- 21) The pancreas is involved in the digestion of _____.
I) protein II) fat III) nucleic acids IV) carbohydrates
A) I and III B) I, II, and IV C) II, III, and IV D) I, II, III, and IV
- 22) What will be the long-term effect of blocking the lymphatic vessels associated with a capillary bed?
A) an increase in the blood pressure in the capillary bed
B) the area of the blockage becoming abnormally small
C) the accumulation of more fluid in the interstitial areas
D) more fluid entering the venous capillaries
- 23) What role do chloride cells play in osmoregulation of marine fish with bony skeletons?
A) They are involved in excretion of excess salt.
B) They actively transport chloride into the gills.
C) They mediate the movement of salt from seawater through their gills.
D) They actively transport salt across the basolateral membrane of the rectal gland.
- 24) Contact of a sea urchin egg with signal molecules on sperm causes the egg to undergo a brief _____.

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A) acrosomal reaction B) mitosis C) vitellogenesis D) membrane depolarization

25) Immunological memory accounts for _____.

- A) the ability of a helper T cell to signal B cells via cytokines
- B) the ancient observation that someone who had recovered from the plague could safely care for those newly diseased
- C) the human body's ability to distinguish self from non-self
- D) the observation that some strains of the pathogen that causes dengue fever cause more severe disease than others

26) After eating a large meal, which nerves are most active in your digestive system?

- I) parasympathetic nerves II) somatic (motor) nerves III) sympathetic nerves
- A) only I B) only II C) only III D) only II and III

27) Testosterone is an example of a chemical signal that affects the very cells that synthesize it, the neighboring cells in the testis, along with distant cells outside the gonads. Thus, testosterone is an example of _____.

- I) an autocrine signal II) a paracrine signal III) an endocrine signal
- A) I, II, and III B) only I and II C) only I and III D) only II and III

28) In excreted urine, a reliable "marker" that a pregnancy has initiated is _____.

- A) estrogen B) human chorionic gonadotropin (hCG) C) follicle-stimulating hormone D) progesterone

29) Acidity in human sweat is an example of _____.

- A) cell-mediated immune responses B) innate immunity C) acquired immunity D) adaptive immunity

30) The "threshold" potential of a membrane is the _____.

- A) peak amount of depolarization seen in an action potential
- B) minimum depolarization needed to operate the voltage-gated sodium and potassium channels
- C) lowest frequency of action potentials a neuron can produce
- D) minimum hyperpolarization needed to prevent the occurrence of action potentials

第二部份簡答題(每題4分)

1. What kinds of posterior pituitary hormone?
2. The functions of pancreatic secretions?
3. What is adaptive immunity?
4. Morphogenesis of development.
5. Osmoregulation of kidney.
6. Molecular mechanisms of action potential.
7. The functions of synapses.
8. Countercurrent exchange.
9. The regulation of skeleton muscle contraction.
10. Describe the knee-jerk reflex.