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國立臺灣大學 108 學年度碩士班招生考試試題

科目： 普通生物學(C)

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※ 注意：請於試卷內之「非選擇題作答區」依序作答，並應註明作答之大題及小題題號。

1. A genetic mutation can change the amino acid sequence of a protein. How can this destroys the protein's function? (7 分)
2. (1) What makes rough ER rough? (2 分)
(2) Which structure includes all others in the list: smooth ER, endomembrane system, nuclear envelope? (2 分)
3. Some archaea are referred to as "extremophiles." Why? (2 分)
4. Contrast the slug-like stage of a cellular slime mold with the plasmodium of a plasmodial slime mold. (7 分)
5. Please describe how plants defense against pathogens. (15 分)
6. Please answer following questions related to fungi.
 - (1) How many groups that fungi can be classified into? (5 分)
 - (2) Please describe the specific characters of fungi in each group. (5 分)
 - (3) Please describe a generalized life cycle of a fungus undergoing both asexual and sexual life cycle. (5 分)
7. Many inherited disorders in humans are controlled by a single gene.
 - (1) Please describe the difference between 'recessive disorder' and 'dominant disorder'. (2 分)
 - (2) Please give TWO examples (diseases) and describe their disease-causing mechanisms for each disorder. (8 分)
8. Please describe FOUR major sex determination systems in animals based on chromosomes. (8 分)
9. How can a signal molecule from one cell alter gene expression in a target cell without even entering the target cell? (2 分)
10. Cascades of gene expression and cell-to-cell signaling can direct the development of an animal. Please describe key steps in the early development of head-tail polarity in a fruit fly. (5 分)
11. 選擇題，每一小題 1 分：
 - (1). Collagen is
 - A. lipid
 - B. fibrous protein
 - C. globular protein
 - D. carbohydrate
 - (2). All of the following statements about muscle contraction are true EXCEPT;
 - A. The ends of actin filaments move closer together
 - B. Calcium-troponin binding precedes actin-myosin binding
 - C. Calcium-tropomyosin binding precedes actin-myosin binding
 - D. ATP hydrolysis precedes actin-myosin binding
 - E. The length of myosin filaments does not change
 - (3). Which of the following best illustrates homeostasis?
 - A. Most adult humans are between 5 and 6 feet tall.
 - B. The lungs and intestines have large surface areas
 - C. When blood salt concentration goes up, the kidney expels more salt.
 - D. All the cells of the body are about the same size
 - E. When oxygen in the blood decrease, you feel dizzy.

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(4). Negative-feedback mechanisms are:

- A. most often involved in maintaining homeostasis
- B. activated only when a variable rises above a set point
- C. analogous to a furnace that produces heat
- D. involved in contractions during childbirth
- E. found only in birds and mammals

(5). The energy content of fats

- A. is released by bile salts
- B. may be lost unless an herbivore eats some of its feces
- C. is more than two times that of carbohydrates or proteins
- D. can reverse the effects of malnutrition
- E. Both C and D are correct

(6). Which of the following is mismatched with its function?

- A. most B vitamins – coenzymes
- B. Vitamin E – antioxidant
- C. Vitamin K – blood clotting
- D. Iron – component of thyroid hormones
- E. Phosphorous –bone formation, nucleotide synthesis

(7). What is the function of the cilia in the trachea and bronchi?

- A. to sweep air into and out of the lungs
- B. to increase the surface area for gas exchange
- C. to vibrate when air is exhaled to produce sounds
- D. to dislodge food that may have slipped past the epiglottis
- E. to sweep mucus with trapped particles up and out of the respiratory tract

(8). Which organ receives only oxygenated blood?

- A. lung
- B. liver
- C. spleen
- D. gill

(9). Which one of the following mammalian cells is not capable of metabolizing glucose to carbon dioxide aerobically?

- A. liver cells
- B. red blood cells
- C. white bold cells

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D. un-striated muscle cells

(10). If pancreas is removed, the compound which remain undigested is

- A. proteins
- B. carbohydrates
- C. fats
- D. all of the above

(11). Uric acid is the chief nitrogenous wasters in

- A. frog
- B. birds
- C. fishes
- D. man

(12). During fasting, in what sequence that are the following organic compounds used up by the body?

- A. First fats, next carbohydrates and lastly proteins
- B. First carbohydrates, next proteins and last lipids
- C. First proteins, next lipids and lastly carbohydrates
- D. First carbohydrates, next fats and lastly proteins

(13). The functional unit of contractile system in striated muscle is

- A. myofibril
- B. cross bridges
- C. Z band
- D. Sarcomere

(14). Major cytoskeletal protein in microvilli, filopodia, contractile rings, and growth cones

- A. actin
- B. tubulin
- C. troponin
- D. calmodulin
- E. fibronectin

(15). What is the name of the iron-containing protein that gives red blood vessel their color?

- A. hemocyanin
- B. pyrite
- C. hemoglobin

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D. myoglobin

(16). A rise in blood cholesterol may lead to a deposition of cholesterol on the walls of blood vessels. This causes the arteries to lose their elasticity and get stiffened. This is called:

- A. hypertension
- B. hypotension
- C. arteriosclerosis
- D. systolic pressure

(17). Cornea transplant in humans is almost never rejected. This is because

- A. it is composed of enucleated cells
- B. it is a non living layer
- C. it has no blood supply
- D. its cells are least penetrable by bacteria

(18). During the propagation of a nerve impulse, the action potential results from the movement of

- A. K^+ ions from intracellular fluid to extracellular fluid
- B. K^+ ions from extracellular fluid to intracellular fluid
- C. Na^+ ions from extracellular fluid to intracellular fluid
- D. Na^+ ions from intracellular fluid to extracellular fluid

(19). Alzheimer's disease in human is associated with the deficiency of

- A. dopamine
- B. glutamic acid
- C. acetylcholine
- D. gamma aminobutyric acid

(20). The cells responsible for color vision in vertebrates are called

- A. rod cells
- B. cone cells
- C. bipolar cells
- D. cupula cells
- E. ampullae

(21). Two antagonistic hormones are

- A. MSH and TSH
- B. calcitonin and parathyroid hormone

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- C. ADH and GH
- D. oxytocin and prolactin

(22). Which of the following statements about prostaglandins is true?

- A. They are one of the types of target cells
- B. They are produced by endocrine glands.
- C. They travel throughout the body by circulating in the blood.
- D. All of the above are true.
- E. None of the above is true.

(23). Type I diabetes mellitus is caused by a deficiency of

- A. exercise
- B. glucagon
- C. glucose
- D. glycol
- E. insulin

(24). Which of the following is an example of an autocrine regulator?

- A. insulin
- B. prostaglandins
- C. nitric oxide
- D. all of the above
- E. none of the above

(25). Nerve impulses are normally carried toward a neuron cell body by the neuron's

- A. Synaptic cleft
- B. Axon
- C. Hormones
- D. Dendrites

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