

※ 注意：全部題目均請作答於試卷內之「非選擇題作答區」，請標明題號依序作答。

1. Please explain: (1) The endomembrane system. (5 分) (2) How an ER product can be exported from the cell without ever actually crossing a membrane? (5 分)
2. (1) How do most biologists think that the mitochondria and chloroplasts of eukaryotes originated? (5 分) (2) What is the evidence to support this idea? (5 分)
3. (1) Please describe the life cycle of a pine tree. (10 分)
(2) Please describe an important plant disease that is found in pine tree and usually kills affected trees within a few weeks to a few months. (4 分)
4. (1) Please describe how plant uptakes and transports nutrients/water. (10 分)
(2) What are three most common nutrient deficiencies found in plants? How can you diagnose these deficiencies based on phenotypes? (6 分)
5. In the human bodies, meiosis occurs as the testes or ovaries produce gametes.
 - (1) Name 2 events during meiosis that contribute to genetic variations among gametes and indicate the stage of meiosis each occurs. (4 分)
 - (2) If meiosis I is normal, but nondisjunction of one chromosome occurs during meiosis II, what are the karyotypes of the 4 gametes produced? (3 分)
6. Human DNA profiling is now widely used to provide evidence in forensic investigations. Please describe in detail the principles behind this technique? (5 分)
7. Many of the plants we grow for food are ployploids, including barley, potato, and wheat. Taken as an example, bread wheat (*Triticum aestivum*), the most important wheat species, is a polyploid with 42 chromosomes. If you are asked to generate new polyploids for some plant species, how will you do it and why? (5 分)
8. Please explain: (8 分)
 - (1) Macroevolution
 - (2) Proto-oncogenes
 - (3) RNA interference
 - (4) The Hardy-Weinberg equilibrium
9. 選擇題，每 1 小題 1 分：
 - (1). Characteristic of simple epithelium is that they
 - A. are arranged indiscriminately
 - B. continue to divide and help in organ function
 - C. Make a definite layer
 - D. None of above
 - (2). Collagen is
 - A. lipid
 - B. fibrous protein
 - C. globular protein
 - D. carbohydrate
 - (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 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
 - D. un-striated muscle cells
- (9). Which organ receives only oxygenated blood?
- A. lung
 - B. liver
 - C. spleen
 - D. gill
- (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). The contractile protein of skeletal muscle involving ATPase activity is

- A. actin
- B. myosin
- C. troponin
- D. tropomyosin

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

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

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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
- 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

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- 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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