單選題 (共 20 題，每題 3 分) ※ 注意：請於試卷內之「選擇題作答區」依序作答。

1) Which of the following animals displays radial symmetry?
A) a sea anemone
B) a fish
C) a worm
D) an alligator
E) a lobster

2) Geckos are able to walk up walls and across ceilings because of
A) the numerous setae on their toes establish molecular bonds with the surfaces of walls and ceilings.
B) the sticky adhesive secretions on their feet.
C) the little suction cups on their toes.
D) the sticky saliva licked onto the regions where the gecko is about to walk.
E) their sharp toenails that grasp surfaces.

3) In the countercurrent exchange system of fish gills,
A) blood and water are separated by a thick polysaccharide barrier.
B) blood and water flow in the same direction.
C) blood flow in the gills reverses direction with every heartbeat.
D) water flow over the gills reverses direction with every inhalation.
E) blood and water flow in opposite directions.

4) The largest blood vessel in the human body is the
A) pulmonary artery.
B) aorta.
C) vena cava.
D) arteria maxima.
E) superior vena cava.

5) During which phase of the heartbeat does the heart fill with blood?
A) atrial phase
B) interphase
C) resting phase
D) diastole
E) systole

6) Which of the following cell types is responsible for humoral immunity?
A) macrophages
B) B cells
C) C lymphocytes
D) natural killer cells
E) neutrophils

7) Monoclonal antibodies are produced
A) when a female is pregnant.

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B) by cancerous tumors.
C) when an animal is infected by a single type of pathogen.
D) by cells that are formed when a B cell is fused to a T cell.
E) by cells are created through the fusion of an activated B cell with a tumor cell.

8) Which of the following kinds of animals excrete their nitrogenous waste entirely as ammonia?
A) fish
B) birds
C) insects
D) garden snails
E) tropical insects

9) When the concentration of glucose in the blood rises following digestion of a meal, what is the hormonal response?
A) Both glucagon and insulin are released.
B) The total amount of insulin in the blood decreases.
C) Glucagon is released but not insulin.
D) Insulin is released but not glucagon.
E) Neither glucagon nor insulin is released.

10) TRH is a type of _____ hormone secreted by the _____.
A) peptide . . . thymus
B) releasing . . . posterior pituitary
C) releasing . . . anterior pituitary
D) releasing . . . hypothalamus
E) steroid . . . thyroid gland

11) The function of a sperm cell's acrosome is to
A) contain the fuel that powers the sperm.
B) fuse with the jelly coat of the egg cell.
C) carry the sperm's nucleus.
D) carry the sperm's helical mitochondria.
E) carry enzymes that are released to form a hole in the egg's jelly coat when the sperm encounters an egg.

12) During transmission across a typical chemical synapse,
A) vesicles containing neurotransmitter diffuse to the receiving cell's plasma membrane.
B) neurotransmitter molecules bind to receptors in the receiving cell's plasma membrane.
C) action potentials trigger chemical changes that make the synaptic vesicles fuse with each other.
D) the binding of neurotransmitters to receptors initiates exocytosis.
E) neurotransmitter molecules are stored in the synaptic knob.

13) A thick filament consists of
A) actin and regulatory proteins.
B) actin and myosin.
C) myosin and regulatory filaments.
D) actin.
E) myosin.

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14) The synapses between neurons and muscle fibers are called
A) neuromotor junctions.
B) muscle synapses.
C) muscle junctions.
D) neuromuscular junctions.
E) musculoneural junctions.

15) Which of the following statements regarding behavior is *true*?
A) Fixed action patterns are learned behavior sequences.
B) A learned behavior triggers a fixed action pattern.
C) Innate behaviors are performed the same way in all members of a genus.
D) A fixed action pattern is under strong genetic control.
E) Innate behaviors are not related to genetics.

16) Lactose intolerance is the inability to
A) produce milk protein
B) digest cellulose
C) digest milk fats
D) produce lactose
E) digest lactose

17) Protein synthesis requires the use of mRNA, which
A) is made in the nucleolus
B) direct the degradation of DNA
C) is not essential to make proteins
D) is translated by the ribosomes
E) direct the replication of DNA

18) Oxygen crosses a plasma membrane by
A) osmosis
B) phagocytosis
C) active transport
D) pinocytosis
E) passive transport

19) During which phase of mitosis does the nuclear envelope re-form and the nucleoli reappear?
A) anaphase
B) metaphase
C) prophase
D) interphase
E) telophase

20) A biological species is defined as a group of organisms that
A) are physically similar
B) are genetically similar
C) share a common ancestor

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D) live together

E) can inbreed in nature and produce fertile offspring

問答題 (共 4 題，每題10分) ※ 注意：請於試卷內之「非選擇題作答區」標明題號依序作答。

1) The human body responds to the introduction of a foreign antigen by initiating the production of antigen-specific antibodies through a mechanism known as "Clonal Selection." This process encompasses a primary response and a secondary response. Please elaborate on the events occurring in each response and provide a comparison of the quantity of antigen-specific antibodies produced during these distinct phases.
2) Please describe an action potential, including the triggering and changes in membrane potential and ionic fluxes across the membrane. If the amplitude of an action potential is lower than normal, what can be going wrong?
3) Please define a "keystone species" and present an example to show how a keystone species affects the biodiversity of a community.
4) Explain the major factors that threaten biodiversity. What is the most effective way to slow down the decrease in marine biodiversity? Why?

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