

科目：普通生物學【生科系碩士在職專班】

1-30 題為選擇題，每題 2 分

01. Which of the following is not considered a secondary metabolite?
(A) glucose
(B) flavonoids
(C) terpenoids
(D) alkaloids
(E) polyketides
02. During noncyclic electron flow of the light reaction, which molecule is the final acceptor of the high-energy electron?
(A) oxygen
(B) P700
(C) NADP+
(D) P680
(E) ATP synthase
03. Where does the Calvin cycle occur?
(A) chloroplast inner membrane
(B) thylakoid membrane
(C) thylakoid lumen
(D) chloroplast stroma
(E) chloroplast outer membrane
04. Which of the following is a feature of eudicots, but not of monocots?
(A) parallel venation
(B) leaf blade
(C) netted venation
(D) nodes
(E) internodes
05. The protoderm of the apical meristem generates what cell types?
(A) epidermal cells, trichomes, and fibers
(B) trichomes, fibers, and guard cells
(C) fibers, guard cells, epidermal cells, and vessels
(D) cork cells, trichomes, epidermal cells, and guard cells
(E) trichomes, guard cells, and epidermal cells
06. Cytokinins are plant hormones that usually affect cell:
(A) elongation
(B) growth
(C) division
(D) wall expansion
(E) turgor pressure
07. One of the important roles of ethylene in plant development is that it induces radial swelling in:
(A) root and stem seedling development
(B) embryo expansion
(C) seed germination

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- (D) stem elongations
 - (E) auxin production
08. Abscisic acid is an important signal, transported from roots to the stem and leaves during times of water stress, that prevents:
- (A) additional auxin production
 - (B) ethylene buildup in the stems
 - (C) leaf drop
 - (D) phototropism
 - (E) stomatal opening
09. Plant roots that are in a horizontal position grow down because:
- (A) Cells on the upper side elongate more than those on the lower side
 - (B) Auxins are stimulating cells on the lower side to elongate more
 - (C) Auxins are being pulled to the upper side
 - (D) Auxins are having no influence on this process
 - (E) Statoliths are pushing auxins to the upper side
10. Some plants extract and concentrate heavy metals from the soil. A current use for such plants is
- (a) to help locate suitable sites for toxic waste storage.
 - (b) to concentrate rare metals for medicinal use.
 - (c) to minimize soil erosion in arid lands.
 - (d) nitrogen fixation by symbiotic bacteria in root nodules.
 - (e) phytoremediation of polluted sites.
11. Which of the following is the male gametophyte of a flowering plant?
- (a) ovule
 - (b) microsporocyte
 - (c) pollen grain
 - (d) embryo sac
 - (e) stamen
12. Recent research has shown that pollination requires that carpels recognize pollen grains as "self or nonself." For self-incompatibility, the system requires
- (a) rejection of nonself cells
 - (b) the rejection of self cells
 - (c) carpel incompatibility with the egg cells
 - (d) that the flowers be incomplete
 - (e) the union of genetically identical sperm and egg cells
13. Why are C4 plants able to photosynthesize with no apparent photorespiration?
- (a) They do not participate in the Calvin cycle
 - (b) They use PEP carboxylase to initially fix CO₂
 - (c) They are adapted to cold, wet climates
 - (d) They conserve water more efficiently
 - (e) They exclude oxygen from their tissues

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14. According to the ABC model of floral development, which genes would be expressed in a showy ornamental flower with multiple sepals and petals but no stamens or carpels?
- (a) A genes only
 - (b) B genes only
 - (c) C genes only
 - (d) A and B genes only
 - (e) A and C genes only
15. The value for Ψ in root tissue was found to be -0.10 MPa. If you take the root tissue and place it in a 0.1 M solution of sucrose ($\Psi = -0.23$), net water flow would
- (a) be from the tissue into the sucrose solution
 - (b) be from the sucrose solution into the tissue
 - (c) be in both directions and the concentrations would remain equal
 - (d) occur only as ATP was hydrolyzed in the tissue
 - (e) be impossible to determine from the values given here
16. A person exposed to a new cold virus would not feel better for one to two weeks because
- (A) specific B cells and T cells must be selected prior to a protective response.
 - (B) it takes up to two weeks to stimulate immunologic memory cells.
 - (C) no memory cells can be called upon, so adequate response is slow.
 - (D) antigen receptors are not the same as for a flu virus to which she has previously been exposed.
 - (E) V-J gene rearrangement must occur prior to a response.
17. An ectothermic organism that has few or no options when it comes to its behavioral ability to adjust its body temperature is a
- (A) terrestrial lizard
 - (B) sea star, a marine invertebrate
 - (C) bluefin tuna, a predatory fish.
 - (D) hummingbird.
 - (E) honeybee in a hive
18. Without functioning parietal cells, which of the following would you expect for an individual?
- (A) can not initiate protein digestion in the stomach
 - (B) can not initiate mechanical digestion in the stomach
 - (C) can not digest fat in the stomach
 - (D) can not produce pepsinogen
 - (E) can not initiate digestion in the small intestine.
19. An anthropologist discovers fossilized animal remains that give strong evidence that the organism had a large, well-formed, most likely 4-chambered heart, with no connection between the right and left sides. Which of the following could most reasonably be hypothesized from this observation?
- (A) that the animal and its relatives had evolved from birds

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- (B) that the animal had a high energy requirement and was endothermic
(C) that the animal was most closely related to reptiles such as alligators and crocodiles
(D) that the animal was a kind of invertebrate
(E) that the species had little to no need to regulate blood pressure
20. The MHC is important in a T cell's ability to
(A) distinguish self from nonself.
(B) recognize specific parasitic pathogens
(C) identify specific bacterial pathogens.
(D) identify specific viruses
(E) recognize differences among types of cancer
21. The body fluids of an osmoconformer would be _____ with its _____ environment.
(A) hyperosmotic; freshwater
(B) isotonic; freshwater
(C) hyperosmotic; saltwater
(D) isoosmotic; saltwater
(E) hypoosmotic; saltwater
22. Which of the following examples is incorrectly paired with its class?
(A) cytokines-local regulator
(B) estrogen-steroid hormone
(C) prostaglandin-peptide hormone
(D) ecdysone-steroid hormone
(E) neurotransmitter-local regulator
23. In vertebrate animals, spermatogenesis and oogenesis differ, in that
(A) oogenesis begins at the onset of sexual maturity, whereas spermatogenesis happens in embryonic development.
(B) oogenesis produces four haploid cells, whereas spermatogenesis produces only one functional spermatozoon.
(C) cytokinesis is unequal in oogenesis, whereas it is equal in spermatogenesis.
(D) oogenesis ends at menopause, whereas spermatogenesis is finished before birth.
(E) spermatogenesis is not completed until after fertilization occurs, but oogenesis is completed by the time a girl is born
24. During the early part of the cleavage stage in frog development, the rapidly developing cells
(A) skip the mitosis phase of the cell cycle.
(B) skip the S phase of the cell cycle.
(C) skip the G₁ and G₂ phases of the cell cycle.
(D) rapidly increase the volume and mass of the embryo.
(E) skip the cytokinesis phase of the cell cycle.
25. In a study of the development of frog embryos, several early gastrulas were stained with vital dyes. The locations of the dyes after gastrulation

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were noted. The results are shown in the following table.

Tissue	Stain
Brain	red
Notochord	yellow
Liver	green
Lens of the eye	blue
Lining of the digestive tract	purple

The ectoderm should give rise to tissues containing

- (A) yellow and purple colors.
- (B) purple and green colors.
- (C) green and red colors
- (D) red and blue colors.
- (E) red and yellow colors.

26. For a neuron with an initial membrane potential at -70 mV, an increase in the movement of potassium ions out of that neuron's cytoplasm would result in

- (A) depolarization of the neuron.
- (B) hyperpolarization of the neuron
- (C) the replacement of potassium ions with sodium ions
- (D) the replacement of potassium ions with calcium ions.
- (E) the neuron switching on its sodium-potassium pump to restore the initial conditions.

27. The steps below refer to various stages in transmission at a chemical synapse:

1. Neurotransmitter binds with receptors associated with the postsynaptic membrane.
2. Calcium ions rush into neuron's cytoplasm.
3. An action potential depolarizes the membrane of the axon terminal.
4. The ligand-gated ion channels open.
5. The synaptic vesicles release neurotransmitter into the synaptic cleft.

Which sequence of events is correct?

- (A) $1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5$
- (B) $2 \rightarrow 3 \rightarrow 5 \rightarrow 4 \rightarrow 1$
- (C) $3 \rightarrow 2 \rightarrow 5 \rightarrow 1 \rightarrow 4$
- (D) $4 \rightarrow 3 \rightarrow 1 \rightarrow 2 \rightarrow 5$
- (E) $5 \rightarrow 1 \rightarrow 2 \rightarrow 4 \rightarrow 3$

28. Which of the following activities would be associated with the parasympathetic division of the nervous system?

- (A) rest and digestion
- (B) release of both acetylcholine and epinephrine
- (C) increased metabolic rate
- (D) fight-or-flight response
- (E) release of epinephrine only

29. Why are we able to differentiate tastes and smells?

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- (A) The action potentials initiated by taste receptors are transmitted to a separate region of the brain than those initiated by receptors for smell.
- (B) The sensory region of the cerebral cortex distinguishes something we taste from something we smell by the difference in the action potential.
- (C) The brain distinguishes between tastes, arising from interoceptors, from smell arising from exteroceptors.
- (D) Because we are able to see what we are tasting, the brain uses this information to distinguish taste from smell.
- (E) Taste receptors are able to detect fewer molecules of the stimulus, which means these receptors will initiate a receptor potential before smell receptors do.

30. It is very difficult to sneak up to a grasshopper and catch it. Why?

- (A) They have excellent hearing for detecting predators.
- (B) They have compound eyes with multiple ommatidia
- (C) They have eyes with multiple fovea.
- (D) They have a camera-like eye with single fovea
- (E) They have binocular vision

31-33 為問答題

31. Describe the major contribution of Charles Darwin to general biology (15分)

32. Explain the term "biological species concept", and describe the pros and cons of this concept in term of defining "a species" (15分)

33. Explain the term "Hardy-Weinberg Principle" and the use of this principle in population genetics (10分)