

※注意：請於試卷上「選擇題作答區」依序作答。

一、單選題 (每題 2 分, 共 50 分)

1. The enzyme nitrogenase
 - (A) allows normally unavailable atmospheric nitrogen to be reduced to available ammonia.
 - (B) is responsible for oxidizing atmospheric nitrogen.
 - (C) attacks the double bond in atmospheric nitrogen gas.
 - (D) is naturally found in most plants.
 - (E) allows plants to access atmospheric nitrogen directly.
2. Plants require water to
 - (A) carry out photosynthesis.
 - (B) transport solutes between plant organs.
 - (C) to cool their bodies by evaporation.
 - (D) maintain the internal pressure that supports their bodies.
 - (E) All of the above
3. Which of the following plant hormones is *least* like the others with respect to chemical structure?
 - (A) Abscisic acid
 - (B) Auxin
 - (C) Cytokinins
 - (D) Ethylene
 - (E) Gibberellins
4. Which of the following is a gametophyte of a flowering plant?
 - (A) A flower
 - (B) An egg
 - (C) A pollen grain
 - (D) An anther
 - (E) The entire adult plant
5. In a short-day plant with a critical day length of 13 hours, flowering would be induced by _____ hours of light alternating with _____ hours of darkness.
 - (A) 12; 12
 - (B) 14; 10
 - (C) 12; 8
 - (D) Both a and b
 - (E) Both a and c
6. Which of the following is *not* an advantage of seed dormancy?
 - (A) It counters the effects of year-to-year variations in the environment.
 - (B) It increases the likelihood that a seed will germinate in the right place.
 - (C) It favors dispersal of the seed.
 - (D) It may result in germination at a favorable time of year.
 - (E) It makes the seed more likely to be digested by birds that disperse it.
7. Which of the following is *not* a consumer–resource interaction?
 - (A) Predation
 - (B) Parasitism
 - (C) Competition
 - (D) Herbivory
 - (E) All of the above are types of consumer–resource interactions.

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8. An RNA virus attack on a plant triggers the production of interference RNA (RNAi), which is derived from the RNA of the _____ and causes the plant to _____.
- (A) virus; die from a viral infection
 - (B) plant; become immune to the virus
 - (C) plant; form mechanical barriers
 - (D) virus; become immune to the virus
 - (E) virus; form mechanical barriers
9. Aquatic biomes are distinguished primarily by
- (A) their temperatures.
 - (B) the speeds of their current.
 - (C) their pH.
 - (D) their turbidity.
 - (E) their salinity.
10. If global respiration exceeded global photosynthesis, the most likely effect would be
- (A) a growth of the organic pool of carbon.
 - (B) a shrinking of the organic pool of carbon.
 - (C) an enhancement of the greenhouse effect.
 - (D) Both a and c
 - (E) Both b and c
11. Which of the following is a primary consumer?
- (A) A predatory fish
 - (B) A detritus-eating roundworm
 - (C) An oak tree
 - (D) A herbivorous beetle larva
 - (E) None of the above
12. Desert plants are able to take up copious amounts of water quickly and then draw on that storage over long periods of time because of their
- (A) fleshy leaves.
 - (B) high concentrations of proline.
 - (C) trichomes.
 - (D) shallow but extensive roots.
 - (E) pneumatophores.
13. Strawberries reproduce asexually through
- (A) cross-hybridization.
 - (B) forced seed germination.
 - (C) apomixis.
 - (D) a runner system.
 - (E) vernalization.
14. Hormones are secreted by
- (A) endocrine glands, such as the thyroid gland.
 - (B) individual cells, such as those lining portions of the digestive tract.
 - (C) exocrine glands, such as the pancreas.
 - (D) Both a and b
 - (E) All of the above

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15. In plants, proton pumps are involved in the process of loading sugars into the phloem for transport. Which of the following is true about this process?
- (A) It is passive.
 - (B) It depends on DNA.
 - (C) It requires ATP
 - (D) It translocates starch.
 - (E) It is an oxidation/reduction reaction.
16. In fungi, cell walls are reinforced by which of the following?
- (A) Chitin
 - (B) Silica
 - (C) Lignin
 - (D) Collagen fibers
 - (E) Microtubules
17. Members of which of the following terrestrial groups have the most water-permeable body covering?
- (A) Insecta
 - (B) Reptilia
 - (C) Aves
 - (D) Arachnida
 - (E) Amphibia
18. Additions or deletions of bases in the nucleotide sequence of a structural gene most often result in
- (A) decreased histone binding
 - (B) an altered sequence of amino acids in the protein that the gene encodes
 - (C) insertion of a new intron into the coding sequence of the gene
 - (D) decreased excision repair
 - (E) increased levels of mRNA production
19. In the formation of the secondary structure of a protein, which of the following are most responsible for holding an alpha-helix region in its helical form?
- (A) Ionic bonds
 - (B) Hydrogen bonds
 - (C) Disulfide bonds
 - (D) Hydrophobic interactions
 - (E) van der Waals interactions
20. Which of the following is *not* one of the functions of glial cells?
- (A) Supporting neurons during embryonic development
 - (B) Supplying nutrients
 - (C) Conducting nerve impulses
 - (D) Consuming foreign particles
 - (E) Insulating nerve tissue
21. Which of the following statements about acetylcholine is *false*?
- (A) Acetylcholine is a neurotransmitter.
 - (B) Acetylcholine is found at mammalian neuromuscular junctions.
 - (C) Both smooth muscles and skeletal muscles respond to acetylcholine.
 - (D) Acetylcholine is degraded by acetylcholinesterase.
 - (E) Acetylcholine increases contractility of the heart.

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22. If an organic acid accumulates in a plant cell in sufficient quantities to affect the cell's pH significantly, then the acid will probably be stored in the
- (A) cytosol
 - (B) vacuole
 - (C) nucleus
 - (D) mitochondria
 - (E) chloroplasts
23. The fight-or-flight mechanisms are a function of the _____ branch of the autonomic nervous system.
- (A) sympathetic
 - (B) parasympathetic
 - (C) contralateral
 - (D) efferent
 - (E) afferent
24. The hormone erythropoietin is released by the kidney
- (A) to remove old red blood cells from circulation.
 - (B) in response to high levels of oxygen in circulation.
 - (C) in response to low levels of hemoglobin.
 - (D) to stimulate production of red blood cells.
 - (E) to stimulate platelet formation.
25. Which of the following statements about MHC I proteins is true?
- (A) They are found primarily on immune system cells.
 - (B) They protect a developing fetus from its mother's immune system.
 - (C) They are found on the surface of most mammalian cells.
 - (D) They are antibodies.
 - (E) All of the above

※注意：請於試卷上「非選擇題作答區」標明題號並依序作答。

二、名詞解釋 (每題 4 分, 共 40 分)

1. Acrosome reaction
2. Reverse transcriptase
3. Oncogene
4. Cyclin
5. Histone
6. Ubiquitination
7. Action potential
8. Regeneration
9. G-protein
10. Synapse

三、問答題 (每題 10 分, 共 10 分)

1. 請分項比較並說明原核與真核細胞基因表現(gene expression)相同與相異之處。

試題隨卷繳回