

※ 注意：請於試卷內之「選擇題作答區」依序作答。

**I. Multiple-choice questions (4 points each, 100 points in total)**

1. Most functions carried out by elaborate systems of internal membranes in eukaryotes are carried out by the \_\_\_\_\_ of bacteria.

- (A) mitochondria.
- (B) ribosomes.
- (C) chromosomes.
- (D) plasma membranes.
- (E) cell walls.

2. Endosymbiotic dinoflagellates called \_\_\_\_\_ lives in the bodies of marine invertebrates.

- (A) protozoa.
- (B) zooxanthellae.
- (C) diatoms.
- (D) zoospores.
- (E) hyphae.

3. In oogamous sexual reproduction, the gametes are

- (A) the same in size and shape.
- (B) the same in size but differ in motility.
- (C) both motile but differ in size.
- (D) a motile sperm cell and a large, nonmotile egg.
- (E) none of the above.

4. Red tides are dangerous because the:

- (A) dinoflagellates cause them to produce a strong neurotoxin.
- (B) euglenoids cause them to produce a toxin that causes severe flulike symptoms.
- (C) green algae cause them to produce a severe allergic reaction in most people.
- (D) diatoms cause them to produce severe gastric distress.
- (E) red algae that cause them can disrupt shipping by clogging propellers.

5. In ascomycetes, plasmogamy occurs within the:

- (A) antheridium.
- (B) crozier.
- (C) ascogonium.
- (D) ascogenous hypha.
- (C) trichogyne.

6. Rhizoids of mosses:

- (A) provide anchorage to the gametophore.
- (B) absorb water for the rest of the plant.
- (C) absorb minerals for the rest of the plant.
- (D) have chloroplasts.
- (E) conduct water and minerals for the rest of the plant.

7. If you cut a cross section through the shoot apex of a moss, you might find:
- (A) an apical cell shaped like an inverted pyramid.
  - (B) microgametangia.
  - (C) megagametangia.
  - (D) protoxylem and protophloem.
  - (E) several layers of substantially differentiated tissues.
8. The indusium of Polypodiopsida is a:
- (A) cluster of sporangia.
  - (B) leaf outgrowth covering a sorus.
  - (C) leaf outgrowth covering a prothallus.
  - (D) megaphyll.
  - (E) "fiddlehead."
9. Betalains are red pigments found in beets and other members of the order Caryophyllales (cacti, carnations, amaranths, and most carnivorous plants). This pigment is not found in other groups, and the Caryophyllales are derived from a common ancestor. The presence of betalain pigment in members of this group is a:
- (A) homoplasy.
  - (B) synapomorphy.
  - (C) clear indication that the group is polyphyletic.
  - (D) All of these are correct.
10. Megaphylls evolved from:
- (A) microphylls that became more elaborate due to hormonal interactions.
  - (B) enations that became vascularized.
  - (C) spines that became vascularized.
  - (D) three-dimensional branching systems that became planated and webbed.
  - (E) the elaboration of ligules.
11. In the antenna complex, light energy is transferred from one pigment molecule to another by:
- (A) pigment activation.
  - (B) fluorescence.
  - (C) resonance energy transfer.
  - (D) reduction.
  - (E) oxidation.
12. Which of the following statements about the Calvin cycle is FALSE?
- (A) It requires more ATP than NADPH.
  - (B) Each reaction is catalyzed by a specific enzyme.
  - (C) It regenerates ribulose 1,5-bisphosphate.
  - (D) It fixes CO<sub>2</sub>.
  - (E) It uses ATP from noncyclic, but not cyclic, photophosphorylation.
13. On a per unit basis, which of the following would be the most expensive to build energetically?
- (A) A moss plant that is entirely parenchyma.
  - (B) A herbaceous plant that consists mainly of parenchyma, collenchyma, and vascular tissue.
  - (C) A cactus that consists mainly of parenchyma but also contains vascular tissue and sclerenchymatous spines.
  - (D) A woody plant composed mainly of xylem, plus some parenchyma and phloem.
  - (E) An aquatic plant that contains mainly aerenchyma, in addition to vascular tissue.

14. The stem-like axis above the cotyledon(s) is the:  
(A) epicotyl.  
(B) hypocotyl.  
(C) plumule.  
(D) funiculus.  
(E) radicle.
15. In photosynthetic pathway, compared to  $C_3$  plants,  $C_4$  plants  
(A) have the higher rate of photorespiration.  
(B) only use PEP carboxylase for carbon fixation.  
(C) have specialized bundle sheath cells.  
(D) do not use rubisco for carbon fixation.  
(E) are adapted to life in the temperate climate.
16. It is usually advantageous to a species if the offspring of a sporophyte are genetically different than the parent sporophyte. Which of the following would be the least likely to ensure genetically different offspring?  
(A) Pistil and stamens within a flower mature at different times.  
(B) The pollen produced on a plant cannot germinate on stigmas on the same plant.  
(C) The species is dioecious.  
(D) The species is monoecious.  
(E) The plant is pollinated by bees.
17. Which of the following statements about apoplastic phloem loading is FALSE?  
(A) It is driven by a proton gradient.  
(B) The mechanism is sucrose-proton co-transport.  
(C) The sieve tube provides much of the energy for transport.  
(D) In some cases. Active transport occurs across the plasma membrane of the sieve tube.  
(E) In some cases. Active transport occurs across the plasma membrane of the companion cell.
18. In a vascular plant, the least amount of resistance occurs as water moves between:  
(A) tracheids through pit-pairs.  
(B) tracheids through perforations.  
(C) tracheids through plasmodesmata.  
(D) vessel elements through pit-pairs.  
(E) vessel elements through perforations.
19. Which of the following statements about the polarity of an embryo is FALSE?  
(A) It fixes the structural axis of the body.  
(B) It is established only after the zygote has divided.  
(C) It is essential to the development of all higher organisms.  
(D) It refers to the condition in which one end is different from the other end.  
(E) It is a key component of biological pattern formation.
20. Which of the following would not typically cause coat-imposed dormancy?  
(A) impermeability of the seed coat to water.  
(B) impermeability of the seed coat to oxygen.  
(C) prevention of the release of growth promoters from the seed.  
(D) rigidity of the seed coat.  
(E) prevention of the release of growth inhibitors from the seed.

21. Which of the following statements concerning strigolactone is FALSE?
- (A) It is a terpenoid derived from carotenoids.
  - (B) It stimulates bud growth.
  - (C) It is present in root exudates.
  - (D) It promotes the formation of mycorrhizae.
  - (E) It stimulates seed germination of root-parasitic plants.
22. The subapical meristem produces young cells of the pith and cortex called:
- (A) protoderm
  - (B) provascular tissue.
  - (C) ground meristem.
  - (D) metaxylem
  - (E) protoderm and ground meristem.
23. Why would a gene for cytokinin synthesis be fused to a promoter that is expressed only in senescent leaves?
- (A) to delay leaf senescence.
  - (B) to confer resistance to herbicides.
  - (C) to confer resistance to BT toxin.
  - (D) to increase starch content.
  - (E) to increase glyphosate production.
24. Which of the following crops was NOT initially cultivated in the New World?
- (A) maize.
  - (B) common beans.
  - (C) barley.
  - (D) lima beans.
  - (E) peanuts.
25. The pedicel of a flower is:
- (A) a leaflike structure that contains the ovules.
  - (B) the part of the flower stalk to which flower parts are attached.
  - (C) the stalk of a flower or an inflorescence.
  - (D) the stalk of a flower in an inflorescence.
  - (E) the stalk that attaches an ovule to the ovary.