

I. 單選題：(45分，每題1.5分) ※注意：請於試卷「選擇題作答區」依題號作答。

1. Which of the following statements about plastids is FALSE?

- a. They contain one or more nucleoids. b. They have DNA with associated histones.
c. They reproduce by fission. d. Some can synthesize amino acids and fatty acids.
e. Their ribosomes are smaller than cytoplasmic ribosomes.

2. The alignment of cellulose microfibrils in the cell wall is controlled by:

- a. cortical actin filaments. b. nuclear microtubules. c. cortical microtubules.
d. nuclear actin filaments. e. cell wall actin filaments.

3. An example of a selectable marker gene is:

- a. *GUS*. b. the luciferase gene. c. the gene for a green fluorescent protein. d. *lacZ*. e. *amp^R*.

4. By definition, all proteins attached to protruding portions of transmembrane proteins are:

- a. transmembrane proteins. b. integral proteins. c. globular proteins.
d. peripheral proteins. e. glycoproteins.

5. Which of the following statements about alleles is FALSE?

- a. They are different forms of the same gene. b. The site of an allele is called its locus.
c. Interactions between alleles determine the characteristics of diploid organisms.
d. They occupy different sites on homologous chromosomes.
e. Dominant alleles are represented by uppercase letters, recessive alleles by lowercase letters.

6. If *W* represents the allele for purple flower color, and *w* represents the allele for white flower color, what phenotypic ratio would you expect for the offspring of a testcross?

- a. One *WW*: one *ww* b. One *WW*: two *Ww*: one *ww* c. Three *WW*: one *ww*
d. One *WW*: three *ww* e. Three *WW*: two *Ww*: one *ww*

7. Which of the following events occurs in eukaryotic cells but NOT in prokaryotic cells?

- a. RNA polymerase attaches to a particular nucleotide sequence on the DNA.
b. RNA is synthesized using the 3' to 5' DNA strand as a template.
c. Two or more structural genes are transcribed onto a single RNA molecule.
d. mRNA transcripts are extensively modified before they leave the nucleus.
e. tRNAs, rRNAs, and mRNAs are all involved in the translation process.

8. In a population, _____ results from the immigration or emigration of individuals.

- a. mutation b. genetic drift c. gene flow d. natural selection e. nonrandom

9. The most comprehensive studies of seed plant phylogeny are based on differences among _____ sequences of _____.

- a. nucleotide; the *rbcL* gene b. amino acid; Rubisco c. nucleotide; ribosomal RNA
d. nucleotide; mitochondrial genes e. amino acid; cytochrome *c*

10. Which of the following is the uptake of DNA by a prokaryotic cell from its environment?

- a. Binary fission b. Transduction c. Transformation d. Conjugation e. Budding

11. In angiosperms, the mature male gametophyte consists of _____ cells.

- a. 2 b. 3 c. 5 d. 7 e. 9

12. The _____ are photosynthetic bacteria that do not produce oxygen.
a. cyanobacteria b. purple and green bacteria c. mycoplasmas
d. prochlorophytes e. mycoplasma-like organisms
13. An ascoma that is open and cup-shaped is called a(n):
a. cleistothecium. b. perithecium. c. hymenium. d. apothecium. e. ascogonium.
14. Three defining characteristics of the brown algae are:
a. plurilocular sporangia, fucoxanthin, and laminarin.
b. plurilocular sporangia, unilocular sporangia, and fucoxanthin.
c. unilocular sporangia, algin, and plasmodesmata.
d. unilocular sporangia, mannitol, and plasmodesmata.
e. mannitol, fucoxanthin, and laminarin.
15. Which of the following statements about sexual reproduction in bryophytes is FALSE?
a. Sperm are the only flagellated cells produced by bryophytes.
b. The zygote is matrotrophic.
c. Sex is governed by the distribution of sex chromosomes.
d. In the antheridium, the spermatogenous cells are "sterile."
e. Chemicals released from the archegonium attract sperm.
16. The indusium of Filicales is a:
a. leaf outgrowth covering a sorus. b. cluster of sporangia. c. megaphyll.
d. leaf outgrowth covering a prothallus. e. fiddlehead.
17. In the pine life cycle, a pollen grain germinates shortly after it:
a. enters the pollen tube. b. undergoes meiosis. c. forms microspores.
d. comes in contact with the nucellus. e. comes in contact with an archegonium.
18. In most angiosperms, petals are probably evolutionary derivatives of:
a. sepals. b. carpels. c. stamens. d. bracts. e. peduncles.
19. Ultraviolet absorbance in flowers is related to the presence of:
a. anthocyanins. b. flavonols. c. chlorophylls. d. flavonoids. e. carotenoids.
20. Which of the following is NOT one of the six crop plants that provide more than 80 percent of the total calories consumed by humans?
a. Rice b. Wheat c. Potatoes d. Manioc e. Soybeans
21. A monsoon forest is a type of:
a. subtropical mixed forest. b. short-tree forest. c. temperate deciduous forest.
d. tropical rainforest. e. tropical seasonal forest.
22. The sequence of regions in a growing root, beginning immediately behind the rootcap, is:
a. elongation, maturation, cell division. b. cell division, maturation, elongation.
c. cell division, elongation, maturation. d. elongation, cell division, maturation.
e. maturation, elongation, cell division.

23. Which of the following statements about the polarity of an embryo is FALSE?
- It fixes the structural axis of the body.
 - It is established only after the zygote has divided.
 - It is essential to the development of all higher organisms.
 - It refers to the condition in which one end is different from the other end.
 - It is a key component of biological pattern formation.
24. Which primary meristem forms first?
- Shoot apical meristem
 - Root apical meristem
 - Ground meristem
 - Protoderm
 - Procambium
25. Most of the growth of a plant body is the result of:
- morphogenesis.
 - embryogenesis.
 - differentiation.
 - cell division.
 - cell enlargement.
26. In etiolated pea seedlings, ethylene causes _____ longitudinal growth, _____ radial expansion of epicotyls, and _____ growth of epicotyls.
- increased; increased; horizontal
 - increased; decreased; horizontal
 - decreased; increased; horizontal
 - decreased; increased; angular
 - increased; decreased; angular
27. All of the following are associated with fruit ripening EXCEPT:
- an increase in cellular respiration.
 - the digestion of pectin.
 - the metabolism of organic acids to sugars.
 - the degradation of chlorophyll.
 - the metabolism of sugars to starches.
28. Which of the following statements about thigmotropism is FALSE?
- It enables roots to navigate around rocks.
 - It is a response to contact with a solid object.
 - An example is the climbing of tendrils.
 - Cells touching the support lengthen more than cells on the other side.
 - The stems of peas can store the memory of tactile stimulation.
29. During rhizobial infection of a legume, an infection thread is formed by inward growth of cell walls of the:
- root hair.
 - bacteroid.
 - envelope.
 - cortex.
 - nodule.
30. When water moving through the cortex via the apoplastic pathway reaches the endodermis:
- it enters the cell walls.
 - apoplastic movement is stopped by the Casparian strips.
 - it continues through the apoplast.
 - the symplastic pathway is blocked.
 - the transcellular pathway is blocked.

II. 請寫出下列反應發生於細胞中或胞器內之部位 (請以英文作答, 如: nucleus or nuclear envelope of nucleus etc.); (10分, 每題2分)

- Glycolysis
- Electron transport
- Krebs cycle
- Light-dependent reactions
- Calvin cycle

III. 請寫出下列反應中電子接受者或提供者；請以英文作答 (6分, 每題2分)

- 1) Photosystems I and II in plant 2) Aerobic respiration 3) Fermentation

IV. 解釋名詞: (20分, 每題4分)

1. Primary growth & secondary growth
2. Founder effect & bottleneck effect
3. Coleorhiza & coleoptiles
4. Phragmoplast & preprophase band
5. Cytoplasmic inheritance & polygenic inheritance

V. 簡答題: (19分)

1. 試說明植物生活史中如何進行 **sporic meiosis** 以完成其世代交替 (**alternation of generation**)。 (4分)
2. 試比較 **C4**, **CAM** 兩種不同的光合作用型，包含：植物解剖構造特徵及光合作用途徑。 (8分)
3. 試說明 **abscisic acid** 如何調控氣孔的開關。 (3分)
4. 試列出下列農作物之起源地: (a) wheat; (b) corn; (c) rice; (d) sunflower。 (4分)