

一. 選擇題 (1-25 題, 每題二分, 答錯倒扣 0.5 分, 均為單選)

I. Questions 1 to 5, match the one most appropriate answer for each. (2% each)

1. Microtubules
  2. Microfilaments
  3. Intermediate filaments
  4. Integrins
  5. Collagens
- A. A superfamily of integral membrane proteins that bind specifically to extracellular molecules.
  - B. A family of fibrous glycoproteins that are present only in extracellular matrices.
  - C. Are tough, ropelike fibers approximately 10 nm in diameter.
  - D. Are hollow, cylindrical cytoskeletal structures approximately 25 nm in diameter.
  - E. Are solid, thinner structures composed of the protein actin.

II. Questions 6 to 10, match the one most appropriate answer for each (2% each)

6. Tight junctions
  7. Gap junctions
  8. Adherens junctions
  9. Desmosomes
  10. Synapses
- A. Are held together by  $\text{Ca}^{2+}$ -dependent linkages formed between the extracellular domains of cadherin molecules that bridge the 30-nm gap between neighboring cells.
  - B. Are disk-shaped adhesive junctions approximately 1  $\mu\text{m}$  in diameter found in numerous tissues that are subjected to mechanical stress.
  - C. Are located at the very apical end of the junctional complex between adjacent epithelial cells and are composed of occludin.
  - D. Are specialized junctions of neurons with their target cells.
  - E. Are sites between animal cells that are specialized for intercellular communications.

(背面仍有題目, 請繼續作答)

**III. Questions 11 to 15, choose the one most appropriate answer for each. (2% each)**

- 11. Free energy
  - 12. Entropy
  - 13. Enthalpy
  - 14. Exergonic
  - 15. Endergonic
- A. The extent of randomness or disorder in a system
  - B. Thermodynamically favorable
  - C. Thermodynamically unfavorable
  - D. The amount of energy available to do work
  - E. The heat content of a system

**IV. Choose the one best answer (2% each)**

- 16. Ribosomes are made up of
  - A. proteins and carbohydrates.
  - B. proteins and lipids.
  - C. proteins and RNA.
  - D. proteins and DNA.
  - E. RNA and DNA.
- 17. Facilitated transporters
  - A. move solutes against a concentration gradient across the membrane.
  - B. act without the input of energy.
  - C. are driven by the transfer of a phosphate group from ATP to the transporter.
  - D. usually act without changing protein conformation.
  - E. none of the above.

18. What is the relationship between free energy change and standard free energy change for the reaction  $A \leftrightarrow B$ ?
- A.  $\Delta G = \Delta G^\circ + RT \ln [B]/[A]$
  - B.  $\Delta G = \Delta G^\circ - RT \ln [B]/[A]$
  - C.  $\Delta G = \Delta G^\circ + RT \log [B]/[A]$
  - D.  $\Delta G = \Delta G^\circ - RT \log [B]/[A]$
  - E. None of the above
19. Where is the subcellular location of ATP synthase?
- A. Mitochondrial outer membrane
  - B. Mitochondrial inner membrane
  - C. Mitochondrial matrix
  - D. Nucleus
  - E. Ribosome
20. Which of the following statements concerning  $\text{Na}^+/\text{K}^+$ -ATPase is **INCORRECT**?
- A. It is a tetramer consisting of two different membrane-spanning subunits.
  - B. It is an electrogenic pump.
  - C. It couples active transport to ATP hydrolysis.
  - D. It pumps  $\text{K}^+$  ions out of the cell and  $\text{Na}^+$  into the cell.
  - E. None of the above.
21. Which of the following statements concerning bacteriorhodopsin is **INCORRECT**?
- A. It contains retinal group.
  - B. It contains one membrane-spanning helix.
  - C. It carries out a light-driven proton pump.
  - D. It can induce a series of protein conformational changes.
  - E. None of the above.
22. Peripheral membrane proteins
- A. are associated with the membrane by weak electrostatic bonds.
  - B. penetrate deeply into the lipid bilayer.
  - C. have domains that protrude from both the extracellular and cytoplasmic sides of the membrane.
  - D. are always lipid-anchored through glycoposphatidylinositol.
  - E. none of the above.

(背面仍有題目,請繼續作答)

23. Receptor-mediated endocytosis
- A. is the nonspecific uptake of extracellular fluids.
  - B. is the uptake of particulate matter.
  - C. provides a means for the selective and efficient uptake of macromolecules.
  - D. is a protective mechanism rather than a mode of feeding in most animals.
  - E. none of the above.
24. Which of the following statements concerning viruses is **INCORRECT**?
- A. Viruses are noncellular pathogens that can only reproduce when present within a living cell.
  - B. Viral infection may lead to the destruction of the host cells with accompanying production of viral progeny.
  - C. Viral infection may lead to the integration of viral nucleic acid into the DNA of the host cells.
  - D. The genetic material of viruses is double-stranded DNA.
  - E. None of the above.
25. Electron transport in chloroplast occurs on
- A. inner membrane of chloroplast.
  - B. outer membrane of chloroplast.
  - C. thylakoid membrane.
  - D. stroma.
  - E. none of the above.

## 二、問答題

26. Please describe the signal hypothesis, and the properties of uptake targeting signal sequences that direct proteins from the cytosol to organelles. (10%)
27. Please describe briefly the structure of nuclear pore complex (NPC), the essential components and translocation mechanisms involving in nuclear import and export of proteins. (10%)
28. Please define the tumor-suppressor genes and oncogenes, and describe the biological functions of *p53* and *myc* gene. (10%)
29. Please describe the stages of meiosis prophase I, and the biological functions of synaptonemal complex (SC). (10%)

30. Please give the definition of following terms.

- a). Unipotency and Pluripotency stem cells. (4%)
- b). Chimera. (3%)
- c). Cell-autonomous action. (3%)