

考生注意事項：所有考題務必在答案卷上作答，在問題卷上作答者不計分。

I. 配合題（1-15 題，每題二分，答錯倒扣 0.5 分，均為單選）

Questions 1 to 5, match the one most appropriate answer for each.

1. Peptidoglycan
2. Proteoglycan
3. Chitin
4. Cellulose
5. Glycophorin A

- A. Carbohydrate-containing membrane protein of erythrocyte
- B. High molecular weight polyanionic extracellular substance
- C. Structural component of plant cell wall
- D. Exoskeleton of insects
- E. Structural component of bacterial cell wall

Questions 6 to 10, match the one most appropriate answer for each.

6. Plasmodesmata
7. Fibronectin
8. Integrins
9. Gap junctions
10. Selectins

（背面仍有題目，請繼續作答）

- A. Component of extracellular matrix
- B. Cell-surface receptors involved in calcium-dependent interactions between cells and their substratum
- C. Bind to specific arrangements of carbohydrate groups projecting from the surfaces of other cells
- D. Specialized sites of communication between adjoining cells in plants
- E. Specialized sites of communication between adjoining cells in animals

Questions 11 to 15, match the one most appropriate answer for each.

- 11. Peroxisomes
- 12. Glyoxysome
- 13. Endoplasmic reticulum
- 14. Thylakoid membrane
- 15. Golgi apparatus

- A. Network of membranes in which glycoproteins and lipids are synthesized.
- B. Processing and sorting of proteins and lipids destined to be secreted from the cells.
- C. Membrane-bound cytoplasmic vesicles that carry out a number of diverse metabolic reactions, including the oxidation of very-long-chain fatty acids and generation of hydrogen peroxide.
- D. Conversion of stored fatty acids to carbohydrate.
- E. Absorption of light, synthesis of ATP and NADPH, and electron transport.

II. 選擇題 (16-25 題, 每題二分, 答錯倒扣 0.5 分, 均為單選)

- 16. The most useful measure for predicting the direction of chemical reactions in biological systems
 - A. ΔS
 - B. ΔG
 - C. ΔH
 - D. ΔG°
 - E. None of the above

17. In the reaction $A \rightleftharpoons B$, if the K'_{eq} is 10^3 , what is the ΔG° ? ($R = 1.987 \text{ cal/mol}\cdot\text{K}$; $T = 298^{\circ}\text{K}$)

- A. +4.09 kcal/mol
- B. -4.09 kcal/mol
- C. +1.77 kcal/mol
- D. -1.77 kcal/mol
- E. none of the above

18. A competitive inhibitor

- A. binds covalently to the enzyme.
- B. binds at several different sites on an enzyme.
- C. binds to the active sites of an enzyme
- D. lowers the V_m of the enzyme.
- E. none of the above

19. The glucose transporter is an example of

- A. facilitated diffusion
- B. active transport
- C. simple diffusion
- D. electrogenic pump
- E. none of the above

20. The major source of electrons for reductive biosynthesis is

- A. NADH.
- B. NADPH.
- C. ATP.
- D. FADH_2 .
- E. None of the above.

Answer the following questions using the key outlined below: (2% each)

- A. if 1, 2, and 3 are correct
- B. if 1 and 3 are correct
- C. if 2 and 4 are correct
- D. if only 4 is correct
- E. if all four are correct

(背面仍有題目,請繼續作答)

21. Which of the following is necessary for electron transport from both NADH_2 and FADH_2 to O_2 ?
1. Flavin mononucleotide
 2. Fumarate
 3. Succinate dehydrogenase
 4. Coenzyme Q
22. An enzyme's activity is commonly regulated by which of the following mechanisms ?
1. Irreversible inhibition
 2. Covalent modification
 3. Reversible inhibition
 4. Allosteric modulation
23. Facilitated diffusion
1. acts without the input of energy.
 2. is driven by ATP.
 3. moves solutes down a concentration gradient.
 4. is endergonic.
24. Which of the following statements about membranes is correct?
1. All of the membrane's carbohydrate chains face away from the cytosol.
 2. The phospholipid content of the two halves of the bilayer is highly asymmetric.
 3. The fluidity of a lipid bilayer will be increased by increasing the number of double bonds in fatty acids.
 4. The fluidity of a lipid bilayer will be increased by decreasing the temperature.
25. Which of the following statements about the chemiosmotic hypothesis is correct?
1. uncouplers acts by direct inhibiting F_0F_1 ATP synthase.
 2. Electron transfer in mitochondria is accompanied by the translocation of protons from the intermembrane space to the matrix.
 3. An intact inner membrane is not required for oxidative phosphorylation.
 4. The proton motive force drives protons back across the membrane via F_0F_1 ATP synthase.

III. 簡答及問答題 (26 -29題)

26. Please describe the definition and biological functions of the following terms:

- (a). Germ cells. (5%)
- (b). Embryonic stem cells (ES cells). (5%)
- (c). Gametogenesis. (5%)
- (d). Fertilization. (5%)

27. Please compare the differences of chromosomal segregation between mitotic and meiotic divisions, and describe the biological significance of meiosis. (10%)

28. Please describe briefly the essential components and translocation mechanisms involving in nuclear import and export of proteins. (10%)

29. Please describe the G protein cycle. (10%)