

Answer the following questions :

- (1) a) Define the differences between fibrous proteins and globular proteins. (5%)
b) Describe and draw the basic structure and functions of fibrous protein—collagen. (5%)
c) A teenager can grow 4 inches in a year during a “growth spurt”. Assuming that the increase in height is due to vertical growth of collagen fibers (in bone), calculate the number of collagen helix turns synthesized per minute. (5%)
(1 inch = 2.54 cm, length of collagen per turn = 0.96 nm)
- (2) a) Explain how the Michaelis-Menton equation for enzyme kinetics can be solved out from the steady state assumption. (5%)
b) According to the Michaelis-Menton equation, what is the v/V_{max} ratio when $[S] = 4 K_m$. (5%)
c) Describe how the Lineweaver-Burk equation can be derived from the Michaelis-Menton equation. (5%)
d) Draw diagrams to show the differences among the competitive, non-competitive and uncompetitive enzyme inhibition derived from Lineweaver-Burk equation. (5%)
- (3) a) Draw a diagram to illustrate the compartmentalization of glycolysis, Kreb’s cycle and electron transport in a cell from the initial substrate glucose to pyruvate, and to the final products CO_2 and H_2O . (5%)
b) Describe the control points of the pathway of glycolysis in term of inhibitors and activators present. (5%)
c) Explain how $NAD^+/NADH$ and ATP/ADP can be transport between mitochondria and cytosol in cells. (10%)
- (4) a) Draw a diagram to show the expression of human globin genes, α -chain, β -chain and γ -chain at different stages of human development, and explain why. (10%)
b) What are the G-proteins, and describe why protein kinase C, inositol triphosphate (IP3) and diacylglycerol are important in cellular signal transduction. (5%)
c) Give a brief description of peptide hormones and steroid hormones. (5%)

(背面仍有題目,請繼續作答)

- (5) a) Describe the basic components and functions of high performance liquid chromatography (HPLC). (5%)
- b) What is capillary electrophoresis (CE)? Describe the differences between CE and polyacrylamide gel electrophoresis (PAGE) in term of structure and functions. (10%)
- c) Describe the basic technique for the production of monoclonal antibody. (10%)