

系所組別：醫學檢驗生物技術學系

考試科目：生物技術

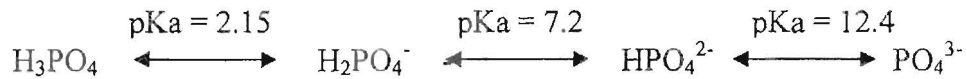
考試日期：0220，節次：2

※ 考生請注意：本試題 可 不可 使用計算機1. (8%) Considering gene knockdown:

- (1) What are the advantages and disadvantages of this technology in comparison to gene knockout?
- (2) What are the strategies commonly employed to accomplish gene knockdown currently?
(Please describe two strategies at least)

2. (6%) Considering regeneration medicine:

- (1) Please compare and contrast between “embryonic stem cells” and “induced pluripotent stem cells (iPS cells)”.
- (2) Please compare and contrast between “reproductive cloning” and “therapeutic cloning”

3. (6%) What are the approximate concentration of H_2PO_4^- in 1 M phosphate solution at pH values of 2, 6, and 10?**Note that:**

4. (10%)

- (1) What are gene knock-out and knock-in animals?
- (2) Please describe two examples of their applications in biomedical research.

5. (10%) What are the differences between embryonic and adult stem cells? Can they cure diseases? What are the potential obstacles/difficulties that should be overcome in their applications?

6. (12%) Please give three examples used for high-throughput, automated DNA sequencing and describe the principle of each technique briefly.7. (8%) What is bioimaging? Please give one example for each of the following application:

- (1) Single-cell imaging
- (2) Whole animal visualization
- (3) Clinical diagnosis.

8. (10%) Please describe the term “monoclonal antibody”, and sketch procedures for producing anti-X monoclonal antibody if you have protein X.

(背面仍有題目,請繼續作答)

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9. (10%) From the following figure, please compare the differences between *De novo*, reformulating and repositioning drug discovery.



10. (10%) Using the following statements to briefly describe the characteristics of AFP and the principles of the techniques used.

“ α -fetoprotein (AFP) is a glycoprotein and contains 4% carbohydrate as a single biantennary chain that is N-linked to asparagine-232 of the protein backbone. The microheterogeneity of this carbohydrate chain has been investigated extensively by use of both lectin affinity electrophoresis and isoelectric focusing. Distinct glycoform patterns characteristic of malignant or benign tissue have been found, raising the possibility of improving AFP specificity for HCC by measurement of an HCC-specific glycoform. AFP glycoforms can be differentiated on the basis of their lectin-binding affinity. AFP from HCC patient sera, for example, binds more strongly to concanavalin A than does AFP from nonseminomatous germ cell tumors, and both bind more strongly to Lens culinaris lectin (LCA) than does AFP from patients with benign liver disease. The affinity for LCA is slightly higher for AFP from HCC (AFP-L3) than that from nonseminomatous germ cell tumors (AFP-L2). Assay kits are now available commercially that specifically measure the AFP-L3 and AFP-P4 glycoforms. Numerous reported studies from Japan and other Asian countries have demonstrated that an increase in the AFP-L3 fraction of serum AFP correlates more strongly than conventional serum AFP with adverse histological characteristics of HCC (e.g., greater portal vein invasion, more advanced tumor irrespective of size) and predicts unfavorable outcome.”

11. (10%) Describe at least 4 methods to quantitate low abundance proteins in biological fluids without using radioisotope.