

※ 考生請注意：本試題 可 不可 使用計算機

I. Multiple choices (複選題；每題四分；必須全部答對方能得分)

1. Which of the following techniques can be used for large scale detection of differential gene expression in cancer cells versus normal cell?
 - A. DNA microarray
 - B. proteomics
 - C. restriction fragment length polymorphism (RFLP)
 - D. electrophoresis mobility shift assay (EMSA)
 - E. none of the above

2. Which of the following statements are FALSE about human genome?
 - A. genome size is 3×10^9
 - B. only 1 to 1.4% sequences are translated into protein
 - C. exon and intron comprise more than 25% of the genome
 - D. the genome encodes for less than 20,000 proteins
 - E. majority of sequences are repetitive sequences

3. Which of the following techniques can be used to identify the function of the novel gene *in vivo*?
 - A. novel gene knock-out
 - B. transgenic mice of the novel gene
 - C. delivery of the recombinant protein into mice.
 - D. interference RNA of the gene
 - E. all of the above

4. Erythropoietin (Epoen) drug is used for
 - A. stimulating red blood cell formation.
 - B. treating renal failure disease.
 - C. treating diabetes.
 - D. stimulating platelet production.
 - E. none of the above

5. You amplified a specific gene by RT-PCR and obtained two DNA fragments instead of one fragment. Which of the following mechanism can be used to interpret that?
 - A. alternative splicing
 - B. non-specific amplification of PCR
 - C. DNA degradation by restriction endonuclease
 - D. DNA rearrangement
 - E. all of the above

(背面仍有題目,請繼續作答)

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6. Which of the following process occurs in expression of protein in *E.coli*?
- A. glycosylation of the protein
 - B. phosphorylation of the protein
 - C. disulfide bond formation
 - D. assembly of multiple subunit of the protein
 - E. transport of the protein onto cell membrane
7. Which of the following elements are required in the mammalian cell expression vector?
- A. CMV promoter
 - B. Polyadenylation signal
 - C. Viral origin of replication
 - D. Shine Delgano sequence
 - E. None of the above
8. Overexpression of TNF- α is associated with rheumatoid arthritis. Which of the following strategy can be used to develop drug?
- A. soluble TNF- α receptor
 - B. TNF- α antibody
 - C. antibody against TNF- α receptor
 - D. TNF- α recombinant protein
 - E. all of the above four
9. Which of the following techniques can be used to detect gene expression in the tissues?
- A. Northern blot
 - B. In situ hybridization
 - C. RT-PCR
 - D. Southern blot
 - E. All of the above
10. What is Herceptin?
- A. a drug used for treating metastatic breast cancer
 - B. a monoclonal antibody against an oncogene
 - C. a Her 2 recombinant protein
 - D. a vaccine for hepatitis B virus
 - E. all of the above four

II. 簡答與問答題

11. Please describe at least three monoclonal antibody drugs used in clinics? (5%)

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12. Please describe the methods to make a humanized monoclonal antibody or fully human antibody? (5%)
13. Model system is frequently used to study biological question. Please describe the advantage and disadvantage of using *Caenorhabditis elegans* as a model. (10%)
14. Describe the advantage and disadvantage of using carbohydrate moiety as an antigens in vaccination. (10%)
15. Please describe one major scientific achievement in biotechnology or biomedical science in the year of 2010. (10%)
16. What is metabolomics? (10%)
17. Compare the advantage and disadvantage of proteomics and microarray. (10%)