

本試題是否可以使用計算機：可使用，不可使用（請命題老師勾選）

SIMPLE-CHOICE QUESTIONS 單選題

(Identify the correct statement. Gain two points for each correct question. 每題 2 分)

1. IPTG was used to induce protein expression in *E. coli* expression system. The function of IPTG is similar to _____.
(A) lactose
(B) glucose
(C) sucrose
(D) galactose
2. What material is the target of western blotting?
(A) fatty acid
(B) DNA
(C) RNA
(D) protein
3. What is the melting temperature (T_m) of the primer GATTAGGATTCC?
(A) 34
(B) 44
(C) 54
(D) 64
4. Where is the typical promoter sequences located in animal genes?
(A) -10
(B) -35
(C) -25
(D) -20
5. The cosmid vectors contain the *cos* site of _____.
(A) phage M13
(B) phage λ
(C) phage ϕ X174
(D) phage P1
6. What antibiotic is not commonly used as a selection drug in animals?
(A) kanamycin
(B) ampicillin
(C) neomycin
(D) hygromycin-B

(背面仍有題目,請繼續作答)

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7. Co-transfection refers to
- (A) introduction of two or more different gene constructs into the same host cell.
 - (B) introduction of one gene construct simultaneously into different host cells.
 - (C) either A or B.
 - (D) none of the above.
8. Introduction of foreign DNA and maintenance in extrachromosomal form in a cell would be most likely to result in which of the following?
- (A) stable transfection
 - (B) transient transfection
 - (C) rapid degradation of the introduced DNA
 - (D) any of the above
9. Injection of DNA into zebrafish embryo often leads to
- (A) integration of single copy sequence into one specific target site in the host genome.
 - (B) integration of tandem repeats of the sequence into specific target sites in the host genome.
 - (C) integration of single copy sequence into random sites in the host genome.
 - (D) integration of tandem repeats of the sequence into random sites in the host genome.
10. Which of the followings can be used to introduce new DNA sequences into fish cells?
- (A) embryonic stem cells.
 - (B) the P element.
 - (C) the Cre/lox system.
 - (D) *Agrobacterium tumefaciens Ti plasmid*.
11. What is the limit of DNA size that can be easily cloned in a plasmid vector?
- (A) about 5 kb.
 - (B) about 50 kb.
 - (C) about 300 kb.
 - (D) about 1 Mb.
12. What is the function of phenol red used in a mammalian cell culture medium?
- (A) as an indicator.
 - (B) as a buffer.
 - (C) as an antibiotic.
 - (D) all of the above.
13. Which is the optimal pH condition for most mammalian cells to grow?
- (A) about pH 7.4
 - (B) about pH 8.0
 - (C) about pH 5.0
 - (D) about pH 6.5

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編號：G 82

系所：生物科技研究所甲組, 乙

科目：生物技術

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14. A transgenic organism is one that
- (A) has genes inserted into it from another organism.
 - (B) has genes created through mitosis.
 - (C) normally occurs in nature.
 - (D) none of the above.
15. Which animal's tissue is most similar to human's?
- (A) pig
 - (B) cow
 - (C) sheep
 - (D) goat
16. What are inserted into a cell's DNA along with genes of interest to visually identify transgenic character?
- (A) cultures
 - (B) clones
 - (C) marker genes
 - (D) bioreactors
17. Clones are:
- (A) organisms from which genes are removed.
 - (B) genes that cause the production of twins.
 - (C) genetically identical organisms.
 - (D) organisms which produce a clone protein.
18. Moths in the wild are a pest and damaging to the environment. A form of biological control, which stops the female moth from producing eggs, is being developed. It uses gene technology to control the moth population by altering moth's
- (A) reproductive system.
 - (B) heartbeat.
 - (C) digestive system.
 - (D) fur color.
19. Microarray technology is a process in which:
- (A) A normal human egg has its nucleus removed and then is fused with a somatic (non-egg or sperm related) cell.
 - (B) A genetically altered embryo is implanted into a recipient mother.
 - (C) Genes active within tissues are identified using a complementary DNA probe.
 - (D) A hybrid vector is placed into a host cell.

(背面仍有題目,請繼續作答)

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20. Overexpression of human erythropoietin (EPO) in transgenic plants results in non-functional activity in stimulation of red blood cells. What is the best explanation for that?
- (A) Proteolysis
 - (B) Different glycosylation pattern
 - (C) Different codon usage
 - (D) Promoter not suitable
21. Which of the followings is not correct regarding edible vaccine?
- (A) Transgenic plants can be used to generate edible vaccine.
 - (B) Transgenic animals can be used to generate edible vaccine.
 - (C) Surface antigens of a pathogen need to be expressed.
 - (D) Antibody against a pathogen needs to be expressed.
22. The biotech company Calgene first commercially marketed transgenic tomato called "Flavr Savr" tomato in 1994. Which in the followings is not correct regarding this product?
- (A) The degradation of the cell wall in transgenic tomato was retarded.
 - (B) Shelf-life of tomato can be extended.
 - (C) Transgenic tomato plants grew as well as wild type.
 - (D) Ethylene biosynthesis was inhibited.
23. Which of the followings is not the potential risk for creating transgenic plants?
- (A) Allergic reaction
 - (B) Ecological imbalance
 - (C) Gene flow into environment
 - (D) Enhancement of plant disease resistance
24. Where is not the potential target for plant transformation?
- (A) Nucleus
 - (B) Chloroplast
 - (C) Mitochondria
 - (D) Vacuole
25. Which of the followings is not the potential application for plant cell and tissue culture technology?
- (A) Create transgenic plants
 - (B) Commercial mass-production
 - (C) Breeding for disease resistance
 - (D) Somatic recombination

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本試題是否可以使用計算機：可使用，不可使用（請命題老師勾選）**SHORT ESSAY 簡答題** (Five points for each question. 每題 5 分)

1. Please explain why the density gradient centrifugation using ethidium bromide- caesium chloride can separate the mixture of protein, DNA, and RNA.
2. Please draw and briefly describe what is the Sanger-Coulson's DNA sequencing method.
3. What are liposomes and how are they used to introduce foreign DNA into cells?
4. What properties are required in a vector for overexpression of an inserted gene?
5. List three common reporter genes used to analyze gene expression.
6. How to develop peptide vaccines against viruses?
7. You have been given the task of cloning and expressing a DNA sequence encoding human interferon. You do not have a DNA hybridization probe for human interferon, although you have isolated a human cell line that can be induced to synthesize interferon approximately 100-fold over background levels. Explain your strategy for cloning and expressing this DNA.
8. What is the principle of plant transformation based on *Agrobacterium tumefaciens*?
9. The endotoxin (BT toxin) of *Bacillus thuringiensis* is toxic to some species of insects.
Approach I: *B. thuringiensis* is used as a biological control agent against insect attack in plant protection.
Approach II: BT gene is introduced to plants to resist insect attack.
Please compare the advantage and disadvantage of these two approaches.
10. Is it possible to generate functional mammalian antibody in plants? How to do it? Briefly describe your strategies.