

國立成功大學

112學年度碩士班招生考試試題

編 號：297

系 所：醫學檢驗生物技術學系

科 目：分生與細胞生物

日 期：0207

節 次：第 1 節

備 註：不可使用計算機

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. 請敘述蛋白質修飾的種類及功能。(7 分)
2. 請敘述 DNA 的結構組成。(7 分)
3. 請解釋何謂細胞自噬 (autophagy)? (7 分)
4. RT-PCR 的原理及步驟為何? (7 分)
5. 請說明 Western blot 實驗目的為何? 並簡述其原理及步驟。(7 分)
6. What is "biorthogonal" reactions? Please give two examples. (15 points)
7. If you have isolated a protein X which participated in the signal transduction pathway of cell proliferation in cancer cell. Please clearly describe the procedures for producing monoclonal antibody for protein X by hybridoma technology. (10 points)
8. Based on the mechanism, the reversible inhibition of enzyme can be divided into three common modes. Please write down the name and draw the double reciprocal plots (Lineweaver-Burk plot) of the three mechanisms which must include four concentration of inhibitors (0, low, medium, and high). (15 points)
9. The part labeled "B" and "C" in the accompanying figure are _____. (3 points)
 - (a) a nucleus, a mitochondrion
 - (b) Chromatin, Lysosomes
 - (c) a nucleus, Lysosomes
 - (d) a vacuole, a mitochondrion
 - (e) Chromatin, Ribosomes
10. What primary structures package cellular secretions for export from the cell? (2 points)
 - (a) Golgi bodies
 - (b) Ribosomes
 - (c) Mitochondria
 - (d) Lysosomes
 - (e) Endoplasmic reticula
11. The process by which a cell takes in a small amount of extracellular fluid by the ballooning inward of the plasma membrane is known as _____. (2 points)
 - (a) intracellular digestion
 - (b) exocytosis
 - (c) endocytosis
 - (d) extrusion
 - (e) osmosis
12. Differentiation is the process in which cells _____. (2 points)
 - (a) mature into larger cells
 - (b) change from one type of muscle to another
 - (c) change to repair injuries
 - (d) turn on all the genomic genes

- (e) express different subsets of their genes during development
13. In knockout experiments, _____. (2 points)
- (a) genes are added to chromosomes
 - (b) normal genes are replaced physically by mutated genes
 - (c) genes are mutated or deleted to prevent their expression
 - (d) mRNAs are prevented from attaching to ribosomes
 - (e) the protein products of specific genes are inactivated
14. In prokaryotes, control of gene expression is mainly at the level of _____. (2 points)
- (a) transcription
 - (b) transcript processing
 - (c) transport
 - (d) translation
 - (e) post-translation
15. _____ refers to potentially heritable modifications to DNA that can affect gene expression without changing the DNA sequence. (2 points)
- (a) Genetic
 - (b) Generative
 - (c) Genial
 - (d) Epigenetic
 - (e) Epigenomic
16. A(n) _____ includes the entire genome. (2 points)
- (a) cDNA library
 - (b) transcribed library
 - (c) genomic library
 - (d) RNA library
 - (e) plasmid library
17. Homologous sets of genes ABCDEF and aBCdEF are located on nonhomologous chromosomes. Crossing over between them is suppressed because their locations are the result of _____. (2 points)
- (a) inversion.
 - (b) deletion.
 - (c) duplication.
 - (d) translocation.
 - (e) aneuploidy.
18. A small region of a protein from three species is sequenced and found to be as follows:
species X is alanine, glycine, threonine, alanine
species Y is alanine, glycine, threonine, alanine
species Z is alanine, valine, glycine, threonine, alanine

The difference in the amino acid sequence of species Z is most likely due to this. (2 points)

- (a) Inversion
- (b) Deletion
- (c) Gene duplication
- (d) Translocation
- (e) Insertion

19. Dolly, the cloned sheep, had telomeres that ____ and its lifespan might have been extended by giving her supplementary _____. (2 points)

- (a) were unusually short, Telomeres
- (b) were unusually long, Growth hormone
- (c) were unusually short, Growth hormone
- (d) were unusually long, Telomeres
- (e) were perfectly normal, Telomeres

20. In humans, normal skin pigmentation is influenced by a dominant gene (C), which allows pigmentation to develop. All individuals who are homozygous for the recessive allele (c) are unable to produce an enzyme needed for melanin formation and are therefore referred to as albino. Two normal parents produce an albino child. What are the chances that the next child will be an albino? (2 points)

- (a) 1/2 chance
- (b) 2/3 chance
- (c) 1/4 chance
- (d) 1/8 chance
- (e) no chance