

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）

考試日期：0302，節次：3

**A. Please choose the best answer for each question. (2 points for each) (20%)**

1. Which of the following enzyme can modify histone by removal of acetyl group to affect transcription?

- (a) Gyrase
- (b) HAT
- (c) HDAC
- (d) Exonuclease

2. The following molecule is **NOT** a second messenger?

- (a) GTP
- (b) cAMP
- (c)  $\text{Ca}^{2+}$
- (d) diacylglycerol (DAG)

3. The DNA in its most highly condensed form will occur in which phase of the eukaryotic cell cycle.

- (a) G1 phase
- (b) S phase
- (c) G2 phase
- (d) M phase

4. Which of the following statements is **NOT** true about stem cells?

- (a) Stem cells can be found in brain tissue.
- (b) Stem cells own differentiation activity.
- (c) Stem cells own proliferation activity.
- (d) Stem cells can not be found in adipose tissue.

5. Which enzyme does **NOT** involve in the DNA replication?

- (a) Topoisomerase
- (b) SSB
- (c) Primase
- (d) RecA

6. Which of the following statements is **NOT** true about cancer cells?

(背面仍有題目,請繼續作答)

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- (a) Overexpression of proapoptotic genes can help cancer formation.
- (b) Overexpression of oncogenes can help cancer formation.
- (c) The proliferation-inducers and anti-apoptotic proteins are always classified into oncogenes.
- (d) The negative regulators of cell cycle and growth-arrest inducers are always classified into tumor suppressor.

7. The following functional domain is **NOT** the DNA binding domain.

- (a) Zinc finger domain
- (b) SH2 domain
- (c) bZIP domain
- (d) bHLH domain

8. The following biological item does **NOT** involve in the transcription.

- (a) TATA box
- (b) Insulator
- (c) Enhancer
- (d) Shine-Dalgarno Sequence

9. The following biological item does **NOT** belong to chromosome.

- (a) Centrosome
- (b) Telomere
- (c) Centromere
- (d) Heterochromatin

10. Which organism does **NOT** have nucleus?

- (a) Bacteria
- (b) Plant
- (c) Yeast
- (d) Nematode

**B. Please choose appropriate answers for each question. (4 points for each)  
(20%)**

1. Which of following events can trigger apoptosis?

- (a) Withdrawal of essential growth factor
- (b) Cytotoxic lymphocytes attack target cells

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- (c) Irradiation with  $\gamma$ -ray
- (d) Fas ligand binds to Fas receptor

2. Which methods are applied to detect the level of gene expression?

- (a) Northern blot
- (b) Real-time PCR
- (c) Western blot
- (d) Southern blot

3. You want to compare the levels of mRNAs between tumor and normal cells. Which methods can address this issue?

- (a) Expression cloning
- (b) cDNA microarray
- (c) In situ hybridization
- (d) RT-PCR

4. Which of the following statements is true for the function of biomembrane?

- (a) it defines boundaries and serve as permeability barriers
- (b) it detects and transmit electrical and chemical signals
- (c) it mediates cell-to-cell communications
- (d) it regulates the transport of solutes

5. Which items are belong to antibiotic

- (a) Kanamycin
- (b) Tetracycline
- (c) Luciferin
- (d) Penicillin

**C. Please answer the following questions. (60%)**

1. Please describe four tools for introducing foreign DNA into target cells (8 points)

2. As a mutation occurs and changes the primary structure of protein, what kind of results will happen to protein function? (6 points)

3. Please explain the following biological terms:

- (A) DNA recombination (3 points)

(背面仍有題目,請繼續作答)

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- (B) DNA editing (3 points)
- (C) ORF (open reading frame) (3 points)
- (D) RNA interference (4 points)
- (E) Signal transduction (4 points)
- (F) Homozygous and Heterozygous (4 points)
- (G) Phenotype and Genotype (4 points)

4. Please briefly describe the function of DNA polymerase and RNA polymerase in cells. (5 points)
5. Please briefly describe the replication mechanism in E. coli. (8 points)
6. You cloned a less-characterized transcription factor –IBIA, and you would like to characterize IBIA-regulated downstream genes. Please design and draw a flowchart (流程圖) to describe your idea. (8 points)