

考題共分為四部份，請分四部份作答，每部分可用 1-2 頁試紙作答。

Section A (30 points total)

I. Choose the best answer for each question. (1 point each)

- The posterior lobe of the pituitary gland in humans releases*
(A) TSH and FSH (B) ACTH and LH (C) Oxytocin and vasopression
(D) FSH and LH (E) Prolactin and growth hormone
- How many ATPs are derived from one molecule of pyruvate via the krebs cycle and the electron transport system?*
(A) 12 (B) 14 (C) 15 (D) 18 (E) 20
- The pituitary regulates all of the following except the*
(A) thyroid. (B) Adrenal cortex (C) Ovaries
(D) Testes (E) Adrenal medulla
- The last part of the human small intestine before entering the large intestine is the*
(A) Cecum (B) Jejenum (C) Duodenum
(D) Ileum (E) Pylorus
- All of the following occurs as muscles contract except*
(A) Z bands come closer (B) H zones stay the same
(C) A bands stay the same (D) I bands decrease
(E) Thick and thin filaments slide past each other
- The energy molecule used to attach the 50 S ribosomal subunit to the 30 S subunit is*
(A) GTP (B) ATP (C) NMP (D) NTP (E) ADP
- A plausible directional flow for membrane components in a eukaryotic cell is*
(A) golgi apparatus → rough ER → smooth ER → nuclear envelope
(B) nuclear envelope → rough ER → smooth ER → golgi apparatus → secretory vesicles → plasma membrane.
(C) nuclear envelope → mitochondria e → rough ER → smooth ER → secretory vesicles → plasma membrane.
(D) plasma membrane → secretory vesicles → rough ER → smooth ER → nuclear envelope.
(E) plasma membrane → smooth ER → rough ER → secretory vesicles → nuclear envelope.

(背面仍有題目,請繼續作答)

Section A ...continue

8. Basic drives such as hunger, thirst, sex and rage, as well as internal environmental parameters of blood pressure, heart rate, and body temperature, have all been linked to the functioning of
- (A) the basal ganglia (B) the adrenal gland (C) the pineal gland.
(D) the hypothalamus (E) The corpus callosum.
9. Insulin deficiency is associated with
- (A) An increase in the blood levels of long chain fatty acids.
(B) An accumulation of ketones which may lead to acidosis and dehydration.
(C) A decrease in the blood levels of long chain fatty acids.
(D) A and B (E) A and C
10. Light receptors are sensitive to this part of the spectrum.
(A) 430-750 nm (B) 430-500 (C) 450-900 (D) 600-850 nm (E) None of the above

II. Please briefly define the following terms (10 points)

Maternal effect

Operon

Genetic polymorphism

Chaperone

Clathrin

III. Short-answer Questions (10 points)

- a. What is a typical lifetime of a prokaryotic mRNA molecule (1 point)?
- b. What is meant by heterogeneous nuclear RNA (1 point)?
- c. What common sequences are at the termini of mRNA in eukaryotes (1 point)?
- d. What common sequences are found in the 3'-terminal segment of prokaryotic mRNA (1 point)?
- e. What parts of an mRNA molecule are not translated (1 point)?
- f. What are central lymphoid organs and their roles in immune functions (1.5 points)?
- g. What are peripheral lymphoid organs and their role in immune functions (1.5 points)?
- h. What do you know about intracellular protein degradation (2 points)?

Section B (30 points total; each question 5 points)

I. In tomatoes, red fruit color (R) is dominant to yellow (Y). Suppose a tomato plant homozygous for red is crossed with one homozygous for yellow. Determine the followings:

1. The probability of F1 are 3 red and 1 yellow ?
2. The color ratio of offspring from a cross of the F1 back to the red parent are ?
3. The color ratio of offspring from a cross of the F1 back to the yellow parent are ?

II. If a given population of diploid organisms contains three, and only three alleles of a particular gene (i.e., alleles 1, 2, and 3),

4. How many different genotypes are possible in the population?

III. In human the three alleles I^A , I^B , and i constitute a multiple allelic series that determine the ABO blood group system. A woman of blood group AB marries a man of blood group B whose father was group O. Consider the following questions:

5. What is the probability that their two children will be group A?
6. What is the probability that one daughter will be group AB?

(背面仍有題目,請繼續作答)

Section C (20 points total)

Essay Questions (each essay 10 points):

- I. Correct folding process is crucial for production of functionally active proteins. Please describe (a) the principles of protein folding; (b) the cellular responses in facing of misfolded proteins in eukaryotic cells (10 points)***
- II. RNA splicing is a process that removes introns and joins exons in a primary transcript. A splicing signal may be masked by a regulatory protein, resulting in alternative splicing. Please describe the possibly regulatory mechanism and biological significance of alternative splicing (10 points)***

Section D (20 points total)

I. With facts that a full grown animal *Caenorhabditis elegans* consists of 959 cells and the genome has 97 megabase pairs of around 19000 genes, please write down reasons to explain why the animal is a model organism on Developmental Biology, Cytology and Genomics (10 points).

II. Multiple choice: Write down alphabet that stands in front of an intracellular organism (either facultative or obligate) from list below (10 points)

a. <i>Plasmodium falciparum</i>	b. <i>Candida albican</i>
c. <i>Rickettsia spp.</i>	d. <i>Sacchromyces cerivisiae</i>
e. <i>Trypanosoma brucei</i>	f. <i>Ascaris vermicule</i>
g. <i>Chlamydia spp</i>	h. <i>Mycobacterium tuberculosis</i>
i. <i>Entamoeba histolytica</i>	j. <i>Shigella spp.</i>