

- I. 單選題 (每題 2 分) ※注意：請於答案卷「選擇題作答區」依題號作答。
1. Which of the following materials is not related to a specific intracellular signal transduction pathway? (A) DNA (B)  $IP_3$  (C) cAMP (D) cGMP.
  2. Which of the following statements about G-protein is incorrect?  
(A) When a GTP is replaced by a GDP on a G-protein, the G-protein changes its conformation and becomes activation.  
(B) G-proteins having GTPase activities can convert GTP to GDP.  
(C) G-protein can serve as receptor to bind with specific ligand.  
(D) The activated G-protein can directly activate specific relay proteins.
  3. Transcription is mainly catalyzed by (A) DNA polymerase (B) RNA polymerase (C) helicase (D) protein kinase.
  4. Which of the following is not part of the cell's endomembrane system? (A) endosomes (B) rough endoplasmic reticulum (C) smooth endoplasmic reticulum (D) nuclear membrane
  5. The correct complementary strand of DNA sequence 5'-ATCCAAGC-3' is (A) 5'-TAGGTCG-3' (B) 3'-GCTTGGAT-5' (C) 5'-GCTTGGAT-3' (D) 3'-ATCCAAGC-5'.
  6. Which of the following does not exist in DNA? (A) deoxyribose (B) hexose (C) pyrimidine (D) phosphate.
  7. Archaea (A) are prokaryotes (B) are Gram-positive (C) are Gram-negative (D) include viroids.
  8. Which of the following statements about red algae is incorrect? (A) having flagellated cells (B) having spermata and carpospores (C) having two diploid sporophyte phases (D) having a single haploid gametophyte phase.
  9. Which of the following statements is the function of rubisco on photosynthesis?  
(A) the formation of glucose and fructose from their immediate precursor.  
(B) the synthesis of sucrose from glucose and fructose.  
(C) the initial fixation of  $CO_2$  into organic molecules.  
(D) the splitting of water into protons, electrons, and oxygen.
  10. What is peristalsis?  
(A) A process of fat emulsification in the small intestine.  
(B) Voluntary control of the rectal sphincters regulating defecation.  
(C) The transport of nutrients to the liver through the hepatic portal vein.  
(D) Smooth muscle contractions that move food through the alimentary canal.
  11. The correct sequence of human intestine is  
(A) duodenum → ileum → jejunum → colon → cecum → rectum.  
(B) duodenum → jejunum → ileum → colon → cecum → rectum.  
(C) duodenum → jejunum → colon → ileum → cecum → rectum.  
(D) duodenum → jejunum → ileum → cecum → colon → rectum.
  12. Human breathing is usually regulated by (A) the lung contraction (B)  $CO_2$  concentration in the blood (C) the concentration of RBCs (D) the hemoglobin concentration in RBCs.

13. Human ovulation is **not** involved to (A) luteinizing hormone (B) follicle stimulating hormone (C) human chronic gonadotropin (D) estrogen.
14. Which of the following materials is involved into both endocrine and immunity? (A) serotonin (B) glucocorticoid (C) epinephrine (D) adenocorticotropin.
15. Which of the following statements about animal embryonic development is correct?  
(A) Most of the genes in the nucleus are active during cleavage.  
(B) The egg cytoplasm helps control the differences among cells.  
(C) The yolk present in the egg enhances embryonic cleavage.  
(D) The cells of the animal pole are larger than the cells of the vegetal pole.
16. The three germ layers in a vertebrate are formed after (A) cell cleavage (B) neurulation (C) gastrulation (D) organogenesis.
17. One function of the corpus luteum is to (A) nourish and protect the egg cell (B) stimulate ovulation (C) produce progesterone and estrogen (D) produce testosterone.
18. Which will be the next step after an action potential happened? (A)  $\text{Na}^+$  channels are opened (B)  $\text{Na}^+$  and  $\text{K}^+$  channels are activated (C)  $\text{K}^+$  channels are opened (D)  $\text{Na}^+$  and  $\text{K}^+$  channels are closed.
19. Which of the following molecules does **not** involve into antibody formation in human? (A) interleukin I (B) T cell receptor (C) CD 8 molecules (D) MHC II molecules.
20. A goiter is associated with improper function of (A) adrenal (B) thyroid (C) pancreas (D) parathyroid.
21. Which of the following normally contains proteins? (A) loop of Henle (B) collecting duct (C) proximal tubule (D) Bowman's capsule.
22. All of the followings belong to torpor behavior **except** (A) sleep (B) aestivation (C) hibernation (D) evaporation.
23. Which of the following statements about pollen tubesis correct? (A) providing water and nutrients to ovules (B) transporting sperm cells to ovules (C) the sites where sperm cell and egg fuse (D) growing in response to sucrose.
24. Which of the following statements does **not** happen to eukaryotic RNA? (A) Introns are added to the RNA (B) Exons are spliced together (C) A small cap of extra nucleotides is added to one end of the RNA (D) A long tail of extra nucleotides is added to the other end of the RNA.
25. Which of the following receptor is **incorrectly** paired with the type of energy it transduces?  
(A) chemoreceptor – gustatory (B) nociceptors – olfactory (C) mechanoreceptor - sound  
(D) infrared receptor - heat.

II. 填充 (英文應答; 每題 2 分) ※ 注意: 請於試卷上「非選擇題作答區」標明題號並依序作答。

1. \_\_\_\_\_ generate most of the cell's supply of ATP, which is used as a source of chemical energy.
2. In biology, a \_\_\_\_\_ is a level of taxonomic rank below Kingdom and above Class.

3. \_\_\_\_\_ is the series of events that take place in a cell leading to duplication of its DNA and division of cytoplasm and organelles to produce two daughter cells.
4. \_\_\_\_\_ is a form of programmed cell death that occurs in multicellular organisms.
5. A \_\_\_\_\_ is a region of repetitive nucleotide sequences at each end of a chromosome.
6. When acetyl-CoA combines with oxaloacetate in the Krebs cycle, a 6-carbon compound, \_\_\_\_\_, is formed.
7. \_\_\_\_\_ including catabolism and anabolism is the set of life-sustaining chemical reactions in organisms.
8. The \_\_\_\_\_ of molecular biology is stated as "DNA makes RNA and RNA makes protein".
9. An amino acid residue phosphorylated by a protein kinase by the addition of a covalently bound phosphate group is called \_\_\_\_\_.
10. \_\_\_\_\_ including microfilaments, microtubules and intermediate filaments present in the cytoplasm of all cells.

III. 問答題 (30 分) ※ 注意：請於試卷上「非選擇題作答區」標明題號並依序作答。  
Please describe DNA methylation and microRNA as well as their function on gene expression.

試題隨卷繳回