

國 立 清 華 大 學 命 題 紙

97 學年度\_\_生命科學院、生命科學院醫學生物科技學程\_\_系(所)\_\_甲\_\_組碩士班入學考試

科目\_\_生物學\_\_ 科目代碼\_\_0202、0502\_\_共\_\_2\_\_頁第\_\_1\_\_頁 \*請在【答案卷】內作答

1. Tears protect the eyes by: (A) Flushing and lysozyme, (B) Inflammation, (C) Vasodilation, (D) Stimulating opsonization, (E) Flushing and lysozyme and vasodilation. (2%, single choice)
2. Human cancer causing viruses most often have a \_\_\_\_\_ genome. (A) ssDNA, (B) dsDNA, (C) ssRNA, (D) dsRNA, (E) Prion. (2%, single choice)
3. If the decolorizer is not left on long enough in the Gram-staining procedure, gram-positive organisms will be stained \_\_\_\_\_ and gram-negative organisms will be stained \_\_\_\_\_. (A) purple; pink, (B) purple; colorless, (C) pink; pink, (D) purple; purple, (E) pink; colorless. (2%, single choice)
4. Which of the following statement is not true for methane-oxidizing bacteria? (A) They use methane as a source of both energy and carbon, (B) They first oxidize methane to methanol by methane monooxygenase, (C) The methanol is then oxidized for formaldehyde by methane dioxygenase, (D) Formaldehyde can be assimilated into cell material, (E) One of the two pathways that facilitates formaldehyde assimilation involves the formation of serine. (2%, single choice)
5. Which is true for the comparison of bacteria, archaea and eucarya? (A) The Archaea contains membrane-enclosed nucleus with nucleolus, (B) The Archaea contains three DNA-dependent RNA polymerases, (C) The Bacteria show the sensitivity to rifampicin, while the Archaea and Eucarya are insensitive to rifampicin, (D) Polycistronic mRNA is present in the Bacteria, but not in the Archaea and Eucarya, (E) mRNA splicing, capping and poly A tailing are shown in the Bacteria. (2%, single choice)
6. Intoxications are diseases that result from a specific toxin produced by bacteria. Exotoxins and endotoxins are the two main groups of toxins produced by bacteria. Please compare the primary characteristics (such as: chemical composition, production by gram negative or positive bacteria, cause fever or not, heat stability, location, and any others) of these two groups. (10%)
7. Explain the principle of “nucleic acid hybridization”. (5%)
8. What is the major function of a “signal peptide”? (5%)
9. How does post-translational modification of histone proteins regulate gene transcription? (5%)
10. Define “polyclonal” and “monoclonal” antibodies. Also, briefly describe the methodology for their preparation. (5%)

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11. 神經細胞之 resting membrane potential 是如何形成?resting membrane potential 到底是定值還是非定值? 若 resting membrane potential 若非定值, 請問可能是受到什麼影響? (7%)
12. 研究 ion channel 的特性與功能時, 科學家長常常利用 patch clamp 的技術來研究。請問到底 patch clamp 是測量些什麼東西? 為何利用 patch clamp 技術就可以研究 ion channel 的特性與功能? (7%)
13. synapse 可以分 electrical synapse 與 chemical synapse 兩種, 請說明兩種 synapse 各有那些無法被取代的優點? 使得在演化過程兩種 synapse 都被保留下來(6%)
14. Briefly explain the following terms (10%)
  - Torpor
  - Leptin
  - Sequential hermaphroditism
  - Menopause
  - Oligodendrocytes
15. Spemann and Mangold concluded that the dorsal lip of the blastopore functions as an organizer of the embryo. Describe this classic experiment. (10%)
16. Using the oxygen dissociation curve of hemoglobin and Bohr shift to demonstrate efficient oxygen unloading in the active tissues. (5%)
17. Can you detect hypothalamic releasing hormones in a typical blood sample? Why? (5%)
18. Describe Pavlov's classic conditioning experiment, and define CS (conditioning stimulus) and US (unconditioning stimulus)? (5%)
19. What is the "biological corridor" in Ecology? What's its function? (5%)