

# 大同大學 99 學年度研究所碩士在職班入學考試試題

考試科目：科技英文

所別：生物工程研究所

第(全)頁

註：本次考試 不可以參考自己的書籍及筆記； 不可以使用字典； 不可以使用計算器。

1. Periodontitis (牙周病) is a chronic inflammatory disease that results from an imbalance in the interactions between periodontal pathogens and the host response. This imbalance causes the overexpression of proinflammatory cytokines and the subsequent destruction of supporting connective tissue attachment and alveolar bone (齒槽骨). (15%)
2. The motion of magnetic particles and magnetically labeled biological objects can be manipulated by magnetic forces in microfluidic devices. Magnetic separation of cells typically requires labeling with magnetic beads; the only cells that naturally demonstrate magnetic susceptibility sufficient for magnetic manipulation are RBCs (紅血球) and magnetotactic bacteria. Magnetic fields can extend to relatively long distances and manipulate many magnetic targets simultaneously in wide range of pH, ionic concentrations, and temperatures required for chemical and biological processing in microfluidic systems. (15%)
3. Bacteria typically have a single circular chromosome (染色體) consisting of a single circular molecule of DNA with associated proteins. The chromosome is folded and attached at one or several points to the plasma membrane (細胞膜). The DNA of *E. coli* (大腸桿菌), the most-studied bacterial species, has about 4.6 million base pairs (鹼基對) and is about 1 mm long—1000 times longer than the entire cell. However, the chromosome takes up only about 10% of the cell's volume. (15%)
4. A gene from a vertebrate (脊椎) animal, including a human, can be inserted into the DNA of a bacterium, or a gene from a virus into a yeast may be used. Bacteria with genes for human insulin (胰島素) are now being used to produce insulin for treating diabetes (糖尿病), and a vaccine (疫苗) for hepatitis B (B型肝炎) is being made by yeast carrying a gene for part of the hepatitis virus. Scientists hope that such an approach may prove useful in producing vaccines against other infectious agents (感染物), thus eliminating the need to use whole organisms (生物), as in conventional vaccines. (15%)
5. Modern life is difficult to imagine without plastics, computers, photocopy machines, aspirin, and countless other synthetic materials and technological innovations (技術創新) that have been made possible by understanding matter at atomic and molecular levels through the study of chemistry. (10%)
6. Life as we know it in our biosphere (生物圈) requires oxygen. Fish, insects, birds, mammals, and even plants must bring O<sub>2</sub> into their systems and expel CO<sub>2</sub>. All the food we eat depends ultimately on plants' use of sunlight; during photosynthesis they combine carbon dioxide and water to form sugars that contain the chemical energy required to support most of the life on our planet. (10%)
7. Biomass (生質) is considered to be a renewable (可再生的) resource, one whose supply is unlimited. We have used biomass for thousands of years in the form of wood to heat dwelling (住宅) and cook food. Not only can biomass be burned to produce heat, but the cellulose, starch and sugars in biomass may also be fermented and converted into other materials, such as ethanol, that can be used as fuels and as raw materials for chemical manufacturing. (10%)
8. Life exists on our planet because liquid water is abundant (豐富的) here. The current debate (爭論) over the existence of life elsewhere in our solar system and in other planetary systems hinges on (關鍵在於) the prospect of liquid water existing on those planets. Even the current theories about life on Mars (火星) still rely on the presence of water. (10%)