

國立中央大學八十八學年度碩士班研究生入學試題卷

所別: 生命科學研究所 不分組 科目: 微生物學 共 1 頁 第 1 頁

1. a. Please explain the definition of "SYMBIOSIS" taking place in the microbial world. (use several sentences to explain). (4 points)
b. Please give an example of symbiosis. (4 points)
2. Microorganisms play an important role in the cycling of natural chemical elements.
 - a. Please give two major processes linked to the N cycle. (3 points)
 - b. Please write the chemical equations for these two processes. (3 points)
 - c. Please describe a little bit about the carbon sources of those bacteria performing the above two processes. (2 points)
3. In the Micro-101 lab class, you are assigned to culture *Escherichia coli* in a Petri-dish plate containing the R2A medium during a one-week period. The teaching assistant has prepared the required materials for you to do the work. These include 1) the R2A medium containing peptone, yeast extract and necessary inorganic nutrients for the growth of *E. coli*; 2) the agar; 3) Petri-dishes; 4) required equipment such as autoclave, Bunsen burner, etc...; and 5) of course, a R2A plate with *E. coli* growing on the top of the plate. (Everything you need is there!) Please EXPLICITLY describe the step needed to finish the assignment. (8 points)
4. Please try to connect the person's name with his/her greatest accomplishment in the area of Microbiology. (8 points)
 - a. Carl Woese 1. microscope
 - b. Anton van Leeuwenhoek 2. Infectious disease by microbe
 - c. Robert Koch 3. Disprove spontaneous generation
 - d. Louis Pasteur 4. Phylogeny
5. Please draw a gram-negative bacterium, and identify the outer membrane, peptidoglycan, plasma membrane. (6 points)
6. The earliest form of life on the earth can be dated back to how many years ago. (2 points)
7. A bacterium has a doubling time of 2 hours. What is the growth rate of this bacterium? (2 points)
8. What is a chemolithotrophic bacterium? (2 points)
9. What kind of bacteria can be found in the hot spring environment? Please list at least two kinds (4 points)
10. How many hydrogen bonds are between A:U nucleotide pairing. a) 1, b) 2, c) 3, and d) 4. (2 points)
11. Please compare the properties of the following pairs of microorganisms: (Explain your answer by describing the morphological and physiological properties of the organisms or the diseases caused by the microorganisms etc.) (Each 5 points, total 50 points)
 - 1) *Haemophilus influenzae* vs influenza virus
 - 2) *Clostridium* vs. *Bacillus*
 - 3) *Rhizobium* vs. *Azotobacter*
 - 4) methanogen vs. methanotrophs
 - 5) sulfate reducing bacteria vs. H₂S oxidizing bacteria
 - 6) Hepatitis A virus vs. Hepatitis B virus
 - 7) Enterotoxigenic *Escherichia coli* vs. Enteroinvasive *E. coli*
 - 8) Dengue fever virus vs. Japanese Encephalitis virus
 - 9) measles virus vs. rubella virus
 - 10) Ascomycetes vs. Basidiomycetes

參考用