

华中农业大学二〇〇八年硕士研究生入学考试

试 题 纸

课程名称: 614 微生物学

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注意: 所有答案必须写在答题本上, 不得写在试题纸上, 否则无效。

一. 填空题 (共 15 分, 每题 1 分)

1. Enrichment culture is a method for isolating microorganisms from nature using specific \_\_\_\_\_ and incubation conditions
2. Eukaryote is a cell possessing a membrane-enclosed \_\_\_\_\_ and usually other organelles
3. Chemotaxis means the movement of an organism \_\_\_\_\_ a chemical gradient
4. A gel-like region between the outer surface of the cytoplasmic membrane and the inner surface of the lipopolysaccharide layer of gram-negative bacteria is called \_\_\_\_\_
5. A culture medium composed of digests of chemically undefined substances such as yeast and meat extracts is called \_\_\_\_\_ medium
6. Anaerobic catabolism in which an organic compound serves as both an electron donor and an electron acceptor and in which ATP is produced by substrate-level phosphorylation is a process called \_\_\_\_\_
7. Actinomycetes are \_\_\_\_\_ bacteria. The best-known genus of actinomycetes is \_\_\_\_\_.
8. phototrophic bacteria comprise a large and morphologically heterogeneous group of \_\_\_\_\_
9. All fungi are \_\_\_\_\_, requiring organic compounds for energy and carbon. Fungi are \_\_\_\_\_ or facultatively \_\_\_\_\_
10. Bacteria can be divided into two groups, \_\_\_\_\_ and \_\_\_\_\_
11. \_\_\_\_\_ are microorganisms that obtain their energy to synthesize organic compounds from light.
12. A medium where the ingredients are known is called a \_\_\_\_\_ medium
13. Bacteria that are not able to grow without oxygen are called \_\_\_\_\_
14. The portion of the mycelium concerned with obtaining nutrients is called the \_\_\_\_\_ mycelium; the portion concerned with reproduction is the \_\_\_\_\_ or \_\_\_\_\_ mycelium.
15. Pili function to join bacterial cells together to the transfer of DNA

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from one cell to another. For this reason, they are sometimes also called \_\_\_\_\_ pili.

二. 选择题 (共 10 分, 每题 1 分)

- The process of nitrogen fixation conducted by bacteria converts:  
A. ammonia to nitrate ions      B. nitrate ions to ammonia  
C.  $N_2$  to ammonia              D. ammonia to urea
- The bacteria *bacillus* species produce \_\_\_\_\_. In times of nutrient deficiencies.  
A. prosthecae      B. Endospores      C. stalks      D. fruiting bodies
- Bacteria differ from fungi in a number of characteristics. The cell walls in bacteria are composed of peptidoglycan, while the cell walls of fungi are composed of:  
A. chitin      B. phospholipid      C. protein      D. glucosamine
- Penicillins are not effective against:  
A. cells in log phase      B. cells in stationary phase  
C. cells in death phase      D. all bacterial cells
- The BOD is a measure of water quality that measures:  
A. concentration of organic matter in the water  
B. the number of bacteria in the water  
C. the number of coliform bacteria in the water  
D. the level of oxygen consumption in the water
- Sterilization of culture medium with an autoclave utilizes steam to kill microorganisms. The correct procedure for sterilization with an autoclave is:  
A. 15 min at 121°C at 1 lb/in<sup>2</sup>      B. 15 min at 256°C at 15 lb/in<sup>2</sup>  
C. 15 min at 121°C at 15 lb/in<sup>2</sup>      D. 15 min at 121°C at 30 lb/in<sup>2</sup>
- The generation time for bacteria is determined by:  
A. measuring the time it takes to double the number of bacteria from the time the culture was initiated until the beginning of stationary phase

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- B. measuring the time it takes to double the number of bacteria from lag phase to death phase
  - C. measuring the time it takes to double the number of bacteria from exponential phase to the end of stationary phase
  - D. measuring the time it takes to double the number of bacteria from exponential phase to the beginning of stationary phase
8. In microbiology, a mixed culture means:
- A. the same as a contaminated culture
  - B. one that has been adequately stirred
  - C. one that contains two or more known species
  - D. a pond sample containing algae and protozoa
9. Most of the major antibiotics used in medicine are produced by which of the following genera
- A. Streptococcus    B. Bacillus    C. Streptomyces    D. Aspergillus
10. A native microbial population in soil is called:
- A. indigenous    B. neutral    C. obligatory    D. community

三. 判断与改错题 (如有错误请改正, 共 10 分, 每题 1 分)

- 1. anaerobe is a microorganism that grows best, or exclusively, in the absence of oxygen. ( )
- 2. Lipopolysaccharides is present in both gram-positive and gram-negative cell walls. ( )
- 3. An organism that can synthesize all its required organic components from CO<sub>2</sub> using energy from the sun is a photoautotroph. ( )
- 4. Chemoautotrophs can survive on CO<sub>2</sub> and water alone. ( )
- 5. A bacterial arrangement in packets of eight cells is described as a micrococcus. ( )
- 6. The process of nitrification by bacteria described by Winogradsky converts nitrate ions to ammonia. ( )
- 7. The generation time for bacteria is determined by measuring the time it takes to double the number of bacteria from exponential phase to the beginning of stationary phase. ( )

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8. Fungi can be differentiated from most bacteria by culturing at neutral conditions. Alkaline soils are more favorable for the development of Streptomyces than are acid soils. ( )

9. Archaeobacteria include four distinct groups: the methanogenic bacteria, extreme thermophilic bacteria, extreme halophilic bacteria and extreme low temperature. ( )

10. The BOD is a measure of water quality that measures the level of oxygen consumption in the water. ( )

四. 各词解释 (共 10 分, 每题 2 分)

- 1、一步生长曲线 (one-step growth curve) 2、氨化作用 (ammonification)  
3、温和噬菌体 (temperate phage) 4、化能自养菌 (Chemoautotroph)  
5、富培养基 (enriched medium)

五. 问答题 (共 105 分, 每题 15 分) (提示: 许多问题在回答时, 陈述+图示, 效果会更好)

1. 陈述 (1) G<sup>+</sup> 和 G<sup>-</sup> 细菌细胞壁的结构和功能, (2) Gram Staining 的原理和基本操作步骤, (3) 细菌芽孢抗性机制及芽孢形成过程。
2. 陈述 (1) 丝状真菌基本形态结构, (2) 特化菌丝的结构和功能, (3) 主要繁殖方式, (4) 以根霉为例描述其生活周期。
3. 陈述 (1) 病毒粒子的基本结构和化学组成, (2) 噬菌体的生活周期和 (3) 亚病毒的类型和特点。
4. 陈述 (1) 微生物培养基的类型和培养基配制原则, (2) 细菌生长曲线及其各阶段的特点 (3) 环境中营养物质进入微生物细胞的主要方式。
5. 陈述 (1) 原核微生物的基因重组的主要方式, (2) 基因工程菌构建原理及基本操作步骤。
6. 陈述 (1) 微生物在自然界氮素循环中的作用, (2) 微生物在环境污染中的监测作用和 (3) 菌根对植物生长的促进作用。
7. 根据你掌握的微生物学知识, 请展望微生物在 (1) 污染环境修复中的作用, (2) 新的生物质能源的开发和 (3) 绿色 (环保) 农业的建立中的应用潜力。