

九十一學年度 生命科學院四所 碩士班研究生招生考試

科目 微生物學 科號 0804 共 2 頁第 1 頁 *請在試卷【答案卷】內作答

填充題(已提供第一個字母)(30%)

1. Microbiology is the study of organisms that are usually too small to be seen by the unaided eye; it employs techniques – such as sterilization and the use of culture media—that are required to i _____ and grow these microorganisms.
2. P _____ cells differ from eucaryotic cells in that the former lack a membrane-delimited nucleus, and in other ways as well.
3. Most bacteria have a cell wall outside the plasma membrane to give them shape and protect them from o _____ lysis.
4. Microorganisms can be classified based on their energy and electron sources. Phototrophs use light energy from the oxidation of chemical compounds. Electrons are extracted from r _____ inorganic substances by lithotrophs, and from organic compounds by organotrophs.
5. Culture media can be constructed completely from chemically d _____ components or may contain constituents like peptones and yeast extract whose precise composition is unknown.
6. A c _____ culture system is an open system that can maintain a microbial population in the log phase. There are two types of these: chemostats and turbidostats.
7. Ultraviolet radiation induces the formation of thymine dimers and strand breaks in DNA. Such damage can be repaired by p _____ or dark reactivation mechanisms.
8. The most widely accepted mechanism of oxidative phosphorylation is the chemiosmotic hypothesis in which p _____ force drives ATP synthesis. However, other mechanisms have been proposed.
9. The tricarboxylic acid cycle is the final stage of catabolism in most a _____ cells. It oxidizes acetyl-CoA to CO_2 and forms one GTP, three NADH_2 , and one FADH_2 per acetyl-CoA.
10. Prokaryotic mRNA has nontranslated leader and trailer sequences at its ends. Spacer regions exist between genes when mRNA is p _____.
11. The first enzyme in a pathway and enzymes at branch points are often subject to f _____ inhibition by one or more end products. Excess end product slows its own synthesis.
12. Many biosynthetic enzymes are repressible enzymes when levels are reduced in the presence of end products called c _____.
13. The complete sequence of events extending from the formation of a new cell through the next division is called cell c _____.
14. Transduction is the transfer of bacterial genes by v _____.
15. Plasmids are small, circular, autonomously replicating DNA molecules that can exist independent of the host chromosome. Their genes are not required for host s _____.
16. *Bergey's Manual of Systematic Bacteriology* gives the accepted system of bacterial t _____.
17. The *Enterobacteriaceae*, often called enterobacteria or enteric bacteria, are gram-negative, peritrichously flagellated or nonmotile, facultatively a _____, straight rods with simple nutritional requirements.
18. Nitrogen-fixing cyanobacteria usually form h _____, specialized cells in which nitrogen fixation occurs.
19. A f _____ is a eucaryotic, spore-bearing organism that has absorptive nutrition and lacks chlorophyll; that reproduces asexually, sexually, or by both methods; and that normally has filamentous hyphae surrounded by cell wall, which usually contain chitin.
20. Protozoa move by one of three major types of locomotory organelles: pseudopodia, flagella, or c _____. Some have no means of locomotion.
21. Microorganisms exist in populations and communities, and their interactions with the abiotic environment contribute to the development of different ecosystems. The normal physiological state of microorganisms in natural environments is s _____ unless resources allowing growth become available.

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22. Microbial m_____ are found in many marine and freshwater environments. These complex microbial communities also occur as fossils and represent one of the earliest forms of microbial communities, with some being 3.5 billion years old.
23. In modern biotechnology, microorganisms with specific genetic characteristics can be constructed to meet desired objectives. Earlier, m_____ and screening (selection) were the major means of improving cultures from the available gene pool.
24. Beer and ale are produced from cereals and grains. The starches in these substrates are hydrolyzed, in the processes of malting and mashing, to produce a fermentable wort. *Saccharomyces c*_____ is a major yeast used in the production of beer and ale.
25. Extreme h_____ are aerobic chemoheterotrophs that require at least 1.5 M NaCl for growth. They are found in habitats such as salterns, salt lakes, and salted fish.
26. There are four important types of p_____ mutations: silent mutations, missense mutations, nonsense mutations, and frameshift mutations.
27. Exponential growth is balanced growth, cell components are synthesized at constant rates relative to one another. Changes in culture conditions (e.g., in shift-up and shift-down experiments) lead to unbalanced growth. A portion of the available nutrients is used to generate m_____ energy.
28. The very best light microscope has a r_____ limit of about 0.2 μ m. Because bacteria usually are around 1 μ m in diameter, only their general shape and major morphological features are visible in the light microscope.
29. Bacterial walls are chemically complex and usually contain p_____ or murein.
30. O_____ of any desired sequences can be synthesized by a DNA synthesizer machine. This has made possible site-directed mutagenesis.

問答 (70%)

1. What is the Ames test and how is it carried out? What assumption concerning mutagenicity and carcinogenicity is it based upon? (8%)
2. Describe the major properties of the genus *Streptomyces*. (7%)
3. What are the major types of materials use as carbon and nitrogen sources in industrial fermentations? (5%)
4. What are the major players (cells or molecules) in the human innate immune responses? What are the major antigen-presenting cells in humans? What is the major function of plasma cells? (10%)
5. Give the name (in English) of two bacterial and three viral vaccines that are currently used in Taiwanese children. Indicate which one is live attenuated, inactivated, a purified component (toxoid, capsule polysaccharide or produced with recombinant DNA technology. (10%)
6. Please compare the difference between bacterial endotoxin and exotoxin in their chemical (nature of molecular identity) and biological properties (the way to cause disease). (8%)
7. Use HIV as an example to explain the basic principles of Real-Time PCR. Why is it superior to conventional PCR technique? (8%)
8. What is the molecular target in cells for each of the following anti-microbial agents: (a) Quinolones (b) Amphotericin B (c) Macrolides (d) Cephalosporines. (8%)
9. Why are smallpox and *Bacillus anthracis* considered good biological weapons? (6%)