

本科目不得使用計算機

本科目試題共 2 頁

I. 單選題 (21%)

1. Microbial sterilization is used to (A) decrease the possibility of contaminants growing in a culture. (B) kill bacteria but not necessarily viruses or other microbes. (C) kill all microbes. (D) clean a work area.
2. β -oxidation involves (A) the synthesis of a series of two-carbon compounds. (B) the splitting of hexoses into two-carbon units. (C) the cleaving of two-carbon units from fatty acid chains. (D) the production of disaccharides.
3. In aerobic respiration, the final electron acceptor is (A) hydrogen. (B) oxygen. (C) water. (D) ATP.
4. Ribosomal RNA-based studies reveal that (A) all eukaryotic organisms are related but that all prokaryotic organisms are not necessarily related. (B) all prokaryotic organisms are related but that all eukaryotic organisms are not necessarily related. (C) Archaea are most closely related to viruses. (D) all organisms are related—regardless of kingdom or domain.
5. A microbe growing in a functioning refrigerator is probably a (A) psychrophile. (B) mesophile. (C) thermophile. (D) hyperthermophile.
6. When the population doubles during each given unit of time, the growth is said to be (A) linear. (B) semilogarithmic. (C) exponential. (D) cartesian.
7. Which of the following characteristics can be used to differentiate Bacteria and Archaea? (A) cell wall composition, (B) membrane lipid, (C) rifampicin sensitivity of RNA polymerase, (D) all of the above.
8. Which product of anoxic sewage treatment can be used as alternative energy? (A) CO_2 . (B) O_2 . (C) CH_4 . (D) H_2 .
9. MacConkey's agar is (A) selective but not differential. (B) differential but not selective. (C) both selective and differential. (D) neither selective nor differential.
10. Primary targets for antibiotic action to inhibit bacterial growth include (A) cell wall. (B) plasma membrane. (C) nucleic acids. (D) ribosomes (E) all of the above.
11. Methanogenesis is critical in _____ habitats. (A) oxic (B) anoxic (C) heteroxic (D) all of the above.
12. Bacteria obtain foreign DNA from donor bacteria by (A) conjugation (B) transformation (C) transduction (D) all of the above that may increase the frequency of bacterial evolution.
13. Peptidoglycan contains (A) *N*-acetylglucosamide (B) L-alanine (C) *meso*-diaminopimelic acid (D) D-lysine (E) *N*-acetylmuramic acid that makes it resistant to most peptidases.
14. Agents that kill or destroy bacteria are said to be (A) inhibitory. (B) bactericidal. (C) bacteriostatic. (D) all of the above.

II. 簡答題 (19%)

Please explain the following terms and their functions in microbial survival.

1. PMF (4%)
2. Gas vacuole (3%)
3. Bacteriocin (3%)
4. LPS (3%)
5. Capsule (3%)
6. Siderophore (3%)

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III. 問答題 (60%)

1. Please **list 5 microbial groups/genera** that are commonly **associated with plant roots** and describe their functions (negative or positive) on plant growth. (10 %)
2. Avian influenza viruses H5N2, H5N3 and H5N8 recently caused outbreaks in poultry in Taiwan, please describe the **basic characteristics based on their classification, nucleic acid composition**, and explain what **“H” and “N”** stands for subtyping the strains? In addition, please suggest **at least two methods** for detection, identification and proof the pathogenicity of these viruses. (20%)
3. Please **list three methods** on how to characterize **oxygen requirement of bacteria** and briefly describe the **procedures and mechanisms** of the tests. (15%)
4. Oomycota is currently classified as fungus-like organisms based on general morphology and lifestyle. Please describe their **morphological characteristics** in terms of **hyphae, reproduction structures, types of nuclei in their vegetative state and cell wall compositions**. (15%)