

第一部分

I. 解釋名詞：(24%)

1. Quorum sensing
2. Stationary phase
3. Sigma factor
4. Conjugation
5. Auxotroph
6. Lactic acid fermentation
7. Icosahedral capsids
8. F plasmid

II. 簡答題：(10%)

1. Please give an example to describe the measurement of bacterial growth numbers.
2. Please describe two chemical agents in terms of mechanism of action that can be used to control microorganisms.

III. 單選題：(16%) ※ 請於試卷內之「非選擇題作答區」標明題號依序作答。

1. 0.2 mls of a 10^{-4} dilution of a virus preparation yields 90 plaques. What is the number of PFU per ml in the undiluted virus preparation?
A. 9.0×10^5 B. 4.5×10^6 C. 4.5×10^7 D. 9.0×10^8
2. Bacteriophage that only exhibit lytic replication cycles are called _____ phages.
A. temperate B. virulent C. intemperate D. lytigate
3. Which of the following has been associated with a form of liver cancer?
A. human papilloma virus
B. hepatitis B virus
C. human T-cell lymphotropic virus
D. hepatitis A virus
4. Which of the following does not use RNA as the genome?
A. adenovirus B. poliovirus C. influenza virus D. rabies virus
5. Transposons that transpose by inserting a copy at a new location while a copy remains at the original location are said to transpose by _____ transposition.
A. simple B. composite C. incomplete D. replicative
6. The Ames test
A. can be used to measure the mutagenicity of chemicals.
B. is used to measure the repair of thymine dimers.
C. is used to measure levels of oxygen free radicals.
D. none of the choices
7. During sporulation in *Bacillus subtilis*, inactive precursor forms of new sigma factors are activated at the appropriate time by
A. proteolysis
B. RNA binding
C. phosphorylation
D. chaperone re-folding
8. If *Escherichia coli* is cultured in broth containing both glucose and lactose, it
A. uses glucose preferentially until the supply is exhausted, then uses lactose.
B. uses lactose preferentially until the supply is exhausted, then uses glucose.
C. uses glucose and lactose simultaneously.
D. uses only the glucose (it cannot use lactose as a source of carbon).

見背面

第二部分

一、單選題（每題1分，共20分）※請於試卷內之「選擇題作答區」依序作答。

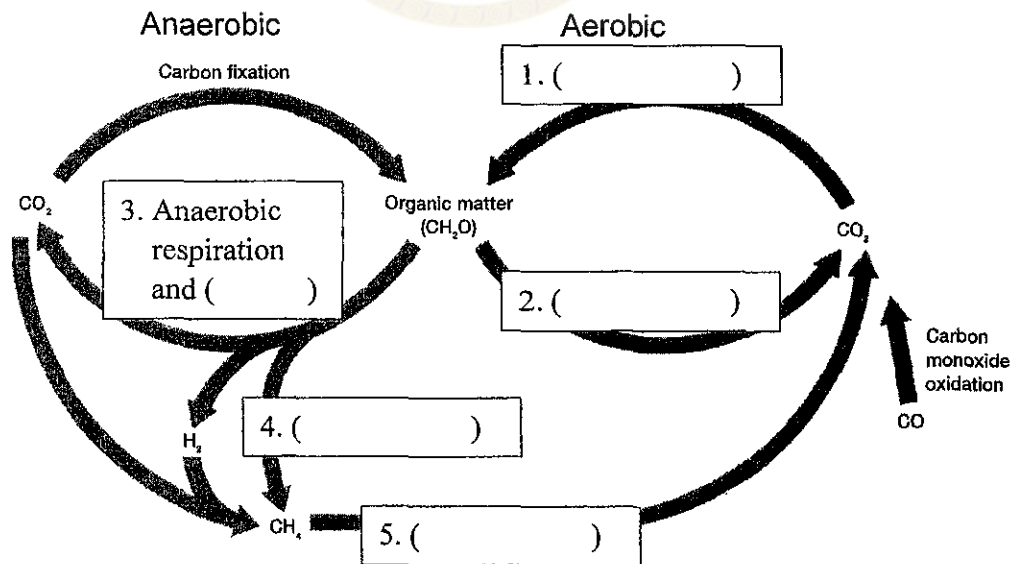
1. Archaeal membranes contain which of the following polar lipids?
A. phospholipids B. sulfolipids C. glycolipids D. all of these
2. Methanogens can live only in _____ environments.
A. aerobic B. anaerobic C. microaerophilic D. all of these
3. Cyanobacteria are best described as
A. all being obligate photolithoautotrophs.
B. all being obligate chemoheterotrophs.
C. some being photolithoautotrophs that can function as chemoheterotrophs in the dark.
D. none of the choices
4. *Helicobacter pylori* is responsible for
A. pneumonia. B. cholera. C. dysentery. D. peptic ulcer disease.
5. The process of conversion of ammonia to nitrate is referred to as
A. nitrogen fixation. B. nitrification. C. ammonification. D. denitrification.
6. Which of the following is associated with dental caries?
A. *Streptococcus pneumoniae* B. *S. mutans* C. *E. faecalis* D. *Lactococcus lactis*
7. Which of the following members of the genus *Bacillus* is currently used as a biological insecticide?
A. *B. cereus* B. *B. subtilis* C. *B. anthracis* D. *B. thuringiensis*
8. Actinomycetes are usually found in _____ habitats.
A. soil B. freshwater C. marine D. all of the choices
9. The body or vegetative structure of a fungus is called a
A. mold. B. thallus. C. hypha. D. yeast.
10. In fungi, spores produced by budding are called
A. blastospores. B. conidiospores. C. arthrospores. D. sporangiospores.
11. The primary storage polysaccharide in fungi is
A. glycogen. B. cellulose. C. starch. D. none of the choices
12. A major fully reduced form of carbon, important in biogeochemical cycling is
A. carbon dioxide. B. carbohydrate. C. methane. D. hydrogen sulfide.
13. When microorganisms such as algae use dissolved carbon dioxide present in freshwater ecosystems, the water pH will
A. increase. B. decrease. C. not be changed. D. first increase then decrease.
14. A mature activated B cell is called a(n)
A. plasma cell. B. dendritic cell. C. natural killer cell. D. spleen cell.
15. Which of the following is a physical barrier in the nonspecific defense of a mammalian host?
A. inflammation B. phagocytosis C. fever D. mucous membranes
16. The alternate complement pathway plays an important role in
A. innate immunity. B. acquired immunity. C. specific immunity.
D. both innate immunity and specific immunity.
17. The characteristics of a pathogen that determine its virulence include which of the following?
A. pathogenicity B. invasiveness C. infectivity D. all of the choices

18. Ti DNA of the genus *Agrobacterium*
- A. is required for nitrogen fixation.
 - B. has been used to construct genetically engineered plants.
 - C. carries the genes needed for root nodule development.
 - D. carries the genes needed for formation of bacteroids.
19. T cells produce and secrete factors which do not directly interact with invading microorganisms but which augment the body's defense mechanisms. These molecules are called
- A. antibodies.
 - B. cytokines.
 - C. immunogens.
 - D. augmetins.
20. A plasmid bearing one or more antibiotic resistance genes is a(n)
- A. F plasmid.
 - B. A plasmid.
 - C. R plasmid.
 - D. D factor.

二、配合題(每題至多選5個答案，每題5分，共10分)

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|------------|--------------|---------------------|------------------------|
| () | 1. Exotoxin | A. Water soluble | I. Direct contact |
| () | 2. Endotoxin | B. Water insoluble | J. Indirect contact |
| | | C. Glycoprotein | K. Weakly immunogenic |
| | | D. Lipoprotein | L. Highly immunogenic |
| | | E. Heat-stable | M. Glycopolysaccharide |
| | | F. Heat-labile | N. Lipopolysaccharide |
| | | G. Species specific | O. Xenobiotic |
| | | H. Non-specific | P. Gnotobiotic |

三、看圖填空。下圖為微生物在有氧及無氧的狀態下經由生物轉換進行碳元素循環，請在空格填寫適當的作用名稱。(每格2分，共10分)



四、請舉例說明微生物在綠色基因科技(green gene technology)如生質能源、分子農場或生物復育等所扮演的角色，並說明其願景及待克服的困難。(10分)

試題隨卷繳回