

國立臺灣海洋大學 103 學年度研究所碩士班招生考試試題

考試科目：微生物學

系所名稱：食品科學系碩士班生技組

1. 答案以橫式由左至右書寫。2. 請依題號順序作答。

**I. Multiple choice questions** (total 30%, please choose **one** appropriate answer, 2% for each question)

- 1) Bacteria can acquire antibiotic resistance by all of the following *except*
  - a. mutation.
  - b. insertion of transposons.
  - c. conjugation.
  - d. snRNPs.
  - e. transformation.
- 2) Plasmids differ from transposons because plasmids
  - a. become inserted into chromosomes.
  - b. are self-replicated outside the chromosome.
  - c. move from chromosome to chromosome.
  - d. carry genes for antibiotic resistance.
  - e. none of the above
- 3) Which of the following is *not* a method of horizontal gene transfer?
  - a. conjugation
  - b. binary fission
  - c. integration of a transposon
  - d. transformation
  - e. transduction
- 4) If you put a gene in a virus, the next step in genetic modification would be
  - a. insertion of a plasmid.
  - b. transduction.
  - c. transformation.
  - d. PCR.
  - e. Southern blotting.
- 5) A drug that intercalates into DNA has the following effects. Which one leads to the others?
  - a. It disrupts transcription.
  - b. It disrupts translation.
  - c. It interferes with DNA replication.
  - d. It causes mutations.
  - e. It alters proteins.
- 6) *Bacillus* and *Lactobacillus* are not in the same order. This indicates that which one of the following is *not* sufficient to assign an organism to a taxon?
  - a. biochemical characteristics
  - b. amino acid sequencing
  - c. phage typing
  - d. serology
  - e. morphological characteristics
- 7) Which of the following is used to classify organisms into the Kingdom Fungi?
  - a. ability to photosynthesize; possess a cell wall
  - b. absorptive; possess cell wall; eukaryotic
  - c. unicellular; possess cell wall; prokaryotic
  - d. unicellular; lacking cell wall; eukaryotic
  - e. ingestive; lacking cell wall; multicellular; prokaryotic
- 8) The ability of a virus to infect an organism is regulated by
  - a. the host species.
  - b. the type of cells.

- c. the availability of an attachment site.
  - d. cell factors necessary for viral replication.
  - e. all of the above
- 9) Which of the following statements is *not* true?
- a. Viruses contain DNA or RNA.
  - b. The nucleic acid of a virus is surrounded by a protein coat.
  - c. Viruses multiply inside living cells using viral mRNA, tRNA, and ribosomes.
  - d. Viruses cause the synthesis of specialized infectious elements.
- 10) Place the following in the order in which they are found in a host cell:  
(1) capsid proteins; (2) infective phage particles; (3) phage nucleic acid.
- a. 1, 2, 3    b. 3, 2, 1    c. 2, 1, 3
  - d. 3, 1, 2    e. 1, 3, 2
- 11) An antimicrobial agent should meet all of the following criteria except
- a. selective toxicity.
  - b. the production of hypersensitivities.
  - c. a narrow spectrum of activity.
  - d. no production of drug resistance.
  - e. none of the above.
- 12) Restriction enzymes were first discovered with the observation that
- a. DNA is restricted to the nucleus.
  - b. phage DNA is destroyed in a host cell.
  - c. foreign DNA is kept out of a cell.
  - d. foreign DNA is restricted to the cytoplasm.
- 13) Which of the following would be the first step in the biosynthesis of a virus with reverse transcriptase?
- a. A complementary strand of RNA must be synthesized.
  - b. Double-stranded RNA must be synthesized.
  - c. A complementary strand of DNA must be synthesized from a DNA template.
  - d. A complementary strand of DNA must be synthesized from an RNA template.
- 14) An encapsulated bacterium can be virulent because the capsule
- a. resists phagocytosis.
  - b. is an endotoxin.
  - c. destroys host tissues.
  - d. interferes with physiological processes.
- 15) Which of the following statements is true?
- a. The primary goal of a pathogen is to kill its host.
  - b. Evolution selects for the most virulent pathogens.
  - c. a successful pathogen doesn't kill its host before it is transmitted.
  - d. a successful pathogen never kill its host.

**II.** Please provide the full name for PCR. What is the purpose of PCR? Please point out the meanings or effects of three individual temperatures. (6%)

**III.** What is the purpose of Ames test? What kind of bacterium is used in Ames test? (4%)

**IV.** Please define the followings: (10%)

1. codon degeneracy
2. frameshift mutation
3. transposons
4. prion
5. shuttle vector

**V.**

1. Please write the protocol for Gram stain, and explain the mechanism for Gram stain that can differentiate bacteria. (10%)
2. Based on the oxygen requirement a bacterium can be classified into one of the following categories: obligate aerobe, obligate anaerobe, microaerophile, facultative anaerobe, and aerotolerant anaerobe. Please design an experiment that you can easily know the oxygen requirement of an unknown bacterium that you isolated from soil. (10%)
3. Please give the structure and function of the organelles :  
(1) mitochondrion; (2) ribosome. (10%)
4. Please compare the cell membrane between prokaryote and eukaryote. (10%)
5. Define (2% each):
  - (1) Osmolysis
  - (2) Innate immunity
  - (3) Chemotaxis
  - (4) Epitope
  - (5) Endotoxin