大同大學 九十一 學年度 轉學考試 試題

考試科目：微生物　系別：生物工程學系　級別：三年級　

註：本次考試不可以參考自己的書籍及筆記；　不可以使用字典；　不可以使用計算器。

I. Multiple choice (two points each)

1. Two culture media were inoculated with four different bacteria. After incubation, the following results were obtained:

Organism	Medium A	Medium B
E. coli	Red colonies	No growth
S. aureus	No growth	Growth
S. enteritidis	Colorless colonies	No growth

Medium A is
   a. selective.
   b. differential.
   c. both selective and differential.
   d. not selective or differential.

2. At which one of the following temperatures the mesophiles have the optimum growth ?
   a. –50°C　b. 0°C　c. 37°C　d. 60°C

3. An organism that has peroxidase and superoxide dismutase but lacks catalase is most likely a
   a. facultative anaerobe.
   b. aerotolerant anaerobe.
   c. obligate anaerobe.
   d. obligate aerobe.

4. The disk-diffusion method was used to evaluate three disinfectants. The results were as follows:

Disinfectant	Zone of inhibition
X	0 mm
Y	5 mm
Z	10 mm

Which disinfectant was the most effective against the organism?
   a. X　b. Y　c. Z　d. All

5. Suppose you inoculate three flasks of minimal salts broth with *E. coli*. Flask A contains glucose. Flask B contains glucose and lactose. Flask C contains lactose. After a few hours of incubation, you test the flasks for the presence of β-galactosidase. Which flasks do you predict will have this enzyme?
   a. A　b. B　c. C　d. B and C

6. The transfer of DNA from a donor to a recipient cell by a bacteriophage is called
   a. conjugation
   b. transcription
   c. transduction
   d. transformation

7. 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

8. The DNA probe, 3' GGCTTA, will hybridize with RNA containing
   a. 3'CCGAAU　b. 5'CCGAAT
   c. 5'CCGAAU　d. 3'GGCAAU

9. You have a small gene that you want replicated by PCR. You add radioactively labeled nucleotides to the PCR thermalcycler. After three replication cycles, what percentage of the DNA single-strands are radioactively labeled?
   a. 0%　b. 12.5%　c. 50%　d. 87.5%

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

11. Which of the following is not one of Koch's postulates?
   a. The same pathogen must be present in every case of the disease
   b. The pathogen must be isolated and grown in pure culture from the diseased host.
   c. The pathogen from pure culture must cause the disease when inoculated into a healthy, susceptible laboratory animal.
   d. The disease must be transmitted from a diseased animal to a healthy, susceptible animal by some form of contact.

12. What is the LD_{50} for the bacterial toxin tested in the example below?

Dilution	No. of Animals Died	No. of Animals Survived
a. 6 μg/kg	0	6
b. 12.5μg/kg	3	3
c. 25 μg/kg	4	2
d. 50 μg/kg	6	0

13. An encapsulated bacterium can be virulent because the capsule
   a. resists phagocytosis.
   b. is an endotoxin.
   c. destroys host tissues.
   d. Infers with physiological processes.

14. All of the following statements about diphtheria toxin are true except
   a. Polypeptide A is the active component.
   b. Polypeptide A inhibits eucaryotic protein synthesis.
   c. Polypeptide B cause transport of diphtheria toxin into a targe cells.
   d. The gene for diphtherotoxin is on a plasmid.

15. Which of the following statements about interferons is not true?
   a. It interferes with viral replication.
   b. It is host specific.
   c. It is released by lymphocytes.
   d. It is virus-specific.

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16. If the following are placed in the order of occurrence, which would be the third step?
    a. Activation of C5-C9
    b. Cell lysis
    c. Antigen-antibody reaction
    d. Activation of C3
    e. Activation of C2-C4
17. The first antibodies synthesized; especially effective against microorganisms.
    a. IgG　b. IgM　c. IgA　d. IgD
18. Monoclonal antibodies against CD4 antigens might be used to treat AIDS because
    a. the HIV has CD4 surface antigens.
    b. susceptible host cells would be killed.
    c. receptor sites would not be available for the virus.
    d. The virus would attach to the antibodies.
19. Assume you stain *Bacillus* by applying malachite green with heat and then counterstain with safranin. Through the microscope, the green structures are
    a. cell walls.　b. capsules.
    c. endospores.　d. flagella.

Use the following choices to answer questions 20-22.

    a. No change will result; the solution is isotonic.
    b. Water will move into the cell.
    c. Water will move out of the cell.
    d. The cell will undergo osmotic lysis.

20. Which statement best describes what happens when a gram-positive bacterium is placed in distilled water and penicillin?
21. Which statement best describes what happens when a gram-negative bacterium is placed in distilled water and penicillin?
22. In bacteria, photosynthetic pigments are found in
    a. chloroplasts.　b. cytoplasm.
    c. chromatophores.　d. mesosomes.
23. Which of the following pairs is mistached?
    a. DNA polymerase — makes a molecule of DNA from a DNA template
    b. RNA polymerase — makes a molecule of RNA from an RNA template
    c. DNA ligase — joins segments of DNA
    d. Transposase — insertion of DNA segments into DNA
24. The difference between simple diffusion and facilitated diffusion is that facilitated diffusion
    a. can move materials from a higher to a lower concentration.
    b. can move materials from a lower to a higher concentration.
    c. requires ATP.
    d. requires transporter proteins.
25. The reaction catalyzed by reverse transcriptase.
    a. DNA → mRNA
    b. mRNA → cDNA
    c. DNA → DNA
    d. mRNA → protein

II. Questions

1. Contrast the terms in the following pairs:
    a. Active and passive immunity (4 points)
    b. T-independent and T-dependent antigens (4 points)
    c. Prophage and provirus (4 points)
    d. Commensalisms, mutalism and parasitism (4 points)
    e. Cyst and oocyst of protozoa (4 points)
2. Diagram the structure of a typical antibody; label the heavy chain, light chain, constant, variable and Fc regions. (5 points)
3. Put the following terms in the correct sequence, from the most general to the most specific: order, class, genus, domain, species, phylum, family. (7 points)
4. Describe the carbon source and energy source of the following types of organisms: photoautotroph, photoheterotroph, chemoautotroph and chemoheterotroph. (8 points)
5. Describe the direct and indirect methods for estimating bacterial numbers. (10 points)