Part I

A. Please choose one answer for each question. (每題兩分，答錯倒扣一分)

1. The formation of a new chromosome, different from either parent, by the combination of genetic material from two organisms is called
   a. transformation.
   b. conjugation.
   c. recombination.
   d. transduction.

2. Carbohydrates and other nutrients are used as cellular constituents
   a. with modification.
   b. without modification.
   c. both with and without modification.
   d. neither with nor without modification.

3. The synthesis of ATP from ADP and $\text{P}^i$, when coupled with the exergonic enzymatic breakdown of a high-energy molecule, is called _________ phosphorylation.
   a. chemiosmotic
   b. oxidative
   c. substrate-level
   d. conformational change

4. Which of the following is not considered the final product of the expression of a gene?
   a. a polypeptide chain
   b. an mRNA molecule
   c. a tRNA molecule
   d. an rRNA molecule

5. Key sequences exist within promoters, which vary somewhat among various promoters but are sufficiently constant that they can be represented by a sequence of bases most often found at each position. These representations are called _________ sequences.
   a. convergence
   b. idealized
   c. consensus
   d. common

6. As the result of exposure to a mutagen, cytosine is substituted for thymine in one strand of DNA. Upon subsequent DNA replication, one of the daughter cells will have a GC pair in this position instead of an AT pair. This is called a(n) _________ mutation.
   a. transversion
   b. transition
   c. frameshift
   d. insertion
7. Which of the following can lead to transition mutations?
   a. incorporation of a base analog that exhibits different base-pairing properties from
      the base it replaces
   b. chemical modification of an existing base in the DNA so that in the next round of
      replication it will pair differently from the unmodified base
   c. Either of these answers is correct.
   d. Neither of these answers is correct.

8. Which of the following is considered a reverse mutation that will restore the wild type
   phenotype?
   a. true reversion back to the wild type base sequence
   b. mutation to a different base sequence, but one that restores the amino acid sequence
      in the protein to the wild type sequence
   c. a mutation that restores the function of a protein even though it does not restore the
      base sequence or the amino acid sequence to the wild type
   d. All of these.

9. When the double helix of a closed circular molecule of DNA is twisted, it is referred to as
   ______ DNA.
   a. hypertwisted
   b. supertwisted
   c. hypercoiled
   d. supercoiled

10. The process by which the base sequence of all or a portion of a DNA molecule is used to
    direct the synthesis of an RNA molecule is called
    a. replication.
    b. transcription.
    c. reverse transcription.
    d. translation.

11. The process by which the base sequence of an RNA molecule is used to direct the synthesis
    of a protein is called
    a. replication.
    b. transcription.
    c. reverse transcription.
    d. translation.

12. In order to be expressed in procaryotes, eucaryotic genes must be associated with a
    bacterial
    a. promoter.
    b. leader sequence.
    c. both promoter and leader sequence.
    d. neither promoter nor leader sequence.

13. In order to express eucaryotic genes in a bacterium, the ______ must first be removed.
    a. introns
    b. exons
    c. both introns and exons
    d. neither introns nor exons
14. The sum total of all chemical reactions occurring in a cell is called
   a. anabolism.
   b. catabolism.
   c. metabolism.
   d. None of these.

15. The breakdown of larger, more complex molecules into smaller, simpler ones with the release and trapping of some energy contained within those molecules is called
   a. anabolism.
   b. catabolism.
   c. metabolism.
   d. None of these.

Questions for Thought 20%

1. How does *E. coli* metabolize glucose to the precursors for the biosynthesis of DNA, amino acids and fatty acid? 10%

2. What are the difference of metabolism and energy generation between Enter-Doughoff and Embden-Meyerhof-Parnas Pathways? 10%
Part II
A. Please choose one answer for each of the questions. (1.5% each)

1. In mutualism
   a. the commensal is metabolically dependent on the host
   b. a reciprocal benefit accrues to both partners
   c. the host is metabolically dependent on the commensal
   d. all of these

2. Which of the following is not part of the lichen association?
   a. ascomycetes
   b. green algae
   c. brown algae
   d. cyanobacteria

3. All protozoa
   a. are capable of cellular locomotion
   b. can reproduce asexually
   c. possess cilia or flagella
   d. are free-living protists

4. The lungs are protected from microorganisms by
   a. the mucociliary blanket
   b. lysozyme in mucus
   c. phagocytic action of alveolar macrophages
   d. all of these

5. Which of the following contribute(s) to the differences between the
archaeobacteria and the eubacteria?
   a. Archaeobacteria have membrane lipids of isoprenyl glycerols either rather than
      fatty acids ester.
   b. Archaeobacteria can stain gram positive or negative, the chemistry of their cell
      walls different from that of the eubacteria, however.
   c. Archaeobacteria carry different tRNA composition, ribosome structure, antibiotic
      sensitivity, and RNA polymerase.
   d. All of these.

6. Which of the following is the major causing agent of peptic ulcer?
   a. Escherichia coli
   b. Helicobacter pylori
   c. Salmonella typhi
   d. Staphylococcus aureus
7. How is viral replication in cell cultures detected?
   a. by the observation of cytopathic effect
   b. by hemadsorption
   c. by the use of interference
   d. all of these

8. Which of the following is considered to be a biological defense mechanism?
   a. skin
   b. fever
   c. indigenous microbiota
   d. fever

9. Phagocytosis leads to destruction of engulfed pathogens by which of the following mechanisms?
   a. lysosomal mediated hydrolysis
   b. phagosomal mediated respiratory burst
   c. both lysosomal mediated hydrolysis and phagosomal mediated respiratory burst
   d. neither lysosomal mediated hydrolysis nor phagosomal mediated respiratory burst

10. Streptomyces which are best known for their synthesis of a variety of antibiotics are usually found in ___ habitats
    a. marine
    b. fresh water
    c. soil
    d. polluted water

11. Acquired immunity refers to the type of specific immunity that
    a. develops after exposure to suitable antigen
    b. is produced after antibodies are transferred from one individual to another
    c. can be obtained by natural or artificial means
    d. all of these

12. Which of the following is a pioneer colonizer of the human intestinal tract?
    a. Candida albicans
    b. Bifidobacterium bifidus
    c. Escherichia coli
    d. Lactococcus lactis

13. Who of the following instituted vaccination procedures as a preventive measure against smallpox?
    a. Pasteur
    b. Ivanowski
    c. Bawden
    d. Jenner

14. Which of the following are responsible for blooms known as red tides?
    a. Rhodophyta (red algae)
    b. Phaeophyta (brown algae)
    c. Pyrrhophyta (dinoflagellates)
    d. Chlorophyta (green algae)
15. Interleukins
a. are large peptides
b. are immunologically specific
c. signal between leukocytes
d. act at a long distance

16. Chemotherapeutic agents that are chemically modified natural products of microorganisms are most specifically referred to as
a. antimicrobial agents
b. synthetic drugs
c. antibiotics
d. semisynthetic drugs

17. Which of the following does not transmit the AIDS virus?
a. semen  b. blood  c. cervical secretion  d. respiratory secretion

18. In mushrooms, the sexual spores are produced in a(n)
a. basidium  b. ascus  c. sporangium  d. zygote

19. Cyanobacteria are procaryotes but carry out oxygenic photosynthesis like plants; this means that
a. they use water as their electron source
b. they produce oxygen as a by-product of photosynthesis
c. both a and b are correct
d. neither a nor b is correct

20. Animal viruses can be cultivated in
a. suitable host animals  b. embryonated eggs
c. tissue cultures  d. all of these

1. List the criteria you’ve learned to classify the virus. (10 %)

2. Please describe the mechanism of antibacterial drug action. (10 %)