國　立　清　華　大　學　命　題　紙

96 學年度__生命科學院、生命科學院醫學生物科技學程__系（所）__甲__組碩士班入學考試

科目____生物學___ 科目代碼__0202、0502__共__4___頁第__1___頁 *請在【答案卷】內作答

I 選擇題(單選): please choose one of the best answers for each question (36 %, 2% each)

1. Which description is true for Methanogenic *Archaea*:
   A. Obligate anaerobes that produce methane
   B. Obligate anaerobes that consume methane
   C. Obligate aerobes that produce methane
   D. Obligate aerobes that consume methane

2. Which mode of action is true for tetracycline?
   A. Tetracycline inhibits cell wall synthesis of bacteria
   B. Tetracycline prevents transcription of the *N*-acetylmuramic acids and results in a weakened peptidoglycan structure of bacteria
   C. Tetracycline has an affinity for bacterial ribosomes and can interfere with aminoacyl-tRNA binding
   D. Tetracycline can block RNA synthesis by binding to and inhibiting the DNA-dependent RNA polymerase

3. Malaria is an important human disease. Which is not true for this disease?
   A. The parasite *Plasmodium* is the causative agent of malaria
   B. The parasite first enters the bloodstream through the bite of an infected female *Anopheles* mosquito
   C. The sporozoites are injected into human with saliva of mosquito and penetrate kidney cell of humans
   D. Diagnosis of malaria is made by demonstrating the presence of parasite within Wright- or Giemsa-stained erythrocytes

4. If the decolorizer is left on too long in the Gram-staining procedure, gram-positive organisms will be stained _____, and gram-negative organisms will be stained _____.
   A. pink; pink
   B. purple; colorless
   C. Purple; pink
   D. purple; purple

5. Which of the following features is most likely to be associated with a lithotroph?
   A. contains chlorophyll
   B. oxidizes hydrogen sulfide to sulfate
   C. ferments carbohydrates
   D. luminescence

6. The most efficient mechanism of gene transfer between *E. coli* cells is
   A. generalized transduction.
   B. transformation.
   C. transposition.
   D. Hfr × F^- conjugation.

7. Differences between mitochondrial and *E. coli* electron transport chains include the following:
   A. The *E. coli* chain is branched and contains a different array of cytochromes.
   B. The fundamental principles on which they operate are different.
   C. Mitochondrial electron transport chains lack iron sulphur proteins.
   D. *E. coli* electron transport chains lack iron sulphur proteins.

8. Immersion oil can be used to increase the resolution achieved with some microscope lenses because it increases the _____ between the specimen and the objective lens.
   A. optical density
   B. refractive index
   C. optical density and refractive index
   D. neither optical density nor refractive index

9. In which of the following types of rokaryotes have split genes been found?
   A. Bacteria
   B. Cyanobacteria
   C. Archaea
   D. None of these

10. Moist heat sterilization readily kills microorganisms; this sterilization is commonly carried out using autoclave. In general, which of the pressure, temperature and time are used?
   A. 5 pounds/in^2, 115°C, 20-30 min
   B. 15 pounds/in^2, 121.5°C, 15-20 min
   C. 25 pounds/in^2, 130.4°C, 15-30 min
   D. 35 pounds/in^2, 143.5°C, 10-30 min

11. Which of the following is NOT required for RNA editing?
    A. UTP
    B. 3′-exonuclease
    C. ligase
    D. kinase

12. Specific RNA can be degraded by specific short dsRNA in cells. This is called:
    A. siRNA
    B. RNAi
    C. gRNA
    D. gene therapy

13. Which of the following recognizes the 5'-splice site?
    A. U1 snRNA
    B. U2 snRNA
    C. Slu7
    D. IBP

14. Transcription activator GAL4 stimulates transcription by facilitating binding of which of the following factors to the pre-initiation complex?
    A. TFII A
    B. TFII B
    C. TFII E
    D. TFII H

15. The factor that does not bind by itself to the promoter but is absolutely required for transcriptional activity of RNA polymerase I is:
    A. CBF
    B. SL1
    C. UBF
    D. TBP

16. Transcription of reconstituted chromatin shows core nucleosomes inhibits transcription by:
    A. 25%
    B. 50%
    C. 75%
    D. 100%

17. Which of the following is involved in mRNA splicing, capping and polyadenylation?
   A. TFII D
   B. CTD
   C. GTP
   D. PAP

18. In the spliceosome cycle, which of the following is released from the complex LAST?
   A. mRNA
   B. U1 snRNA
   C. U2 snRNA
   D. Intron

Ⅱ 問答題(64%)

1. Suppose that two proteins A and B are synthesized initially at the same time because the mRNA A and B are made in response to the same signal. At a later time, when the signal is no longer present, protein A is still made at nearly the same rate, and protein B is not detected. Suggest two possible mechanisms for this temporal regulation of gene expression. (9 %)

2. Why is the two-photon microscope better than the confocal microscope? (5%)

3. Why Type O person is a universal donor, and Type AB person is an universal recipient? (5%)

4. Why the steroid cholesterol is a "temperature buffer" in membrane? (5%)

5. Define the "Endomembrane system" (5%)

6. How to demonstrate that ATP hydrolysis is not a strict requirement for microfilament elongation? (5%)

7. Do you know any dams exist in Taiwan? What have been their ecological and economic benefits and costs? Describe the downstream conditions? (10%)

8. What is the biodiversity? What are some factors that make it difficult to quantify patterns of species diversity/richness? (10%)

9. Why are the theories of gradual phyletic evolution and punctuated equilibria not mutually exclusive? What is the basis for the debate between proponents of each? (10%)