考生注意事項：所有考題務必在答案卷上作答。凡在問題卷上作答者無效。

一、選擇題（均為單選，每題 1 分，答錯倒扣 0.25 分）

1. In a spontaneous reaction, the free energy of a system

   A. becomes equal to zero.
   B. remains unchanged.
   C. decreases.
   D. increases.
   E. none of the above

2. In the mitochondrial electron transport system, the final acceptor of electron is

   A. ubiquinone.
   B. oxygen.
   C. cytochrome b.
   D. cytochrome a_3.
   E. none of the above.

3. A source of protons for the proton gradient within a chloroplast is

   A. water.
   B. phospholipids.
   C. chlorophyll.
   D. cytochrome.
   E. none of the above.

4. A eukaryotic cell differs from a prokaryotic cell in having

   A. DNA molecule.
   B. aerobic respiration.
   C. ribosomes.
   D. organelles.
   E. none of the above

5. Which of the following is not a form of endocytosis?

   A. pinocytosis
   B. phagocytosis
   C. receptor-mediated cytosis
   D. exocytosis
   E. none of the above

6. Plants store glucose as

   A. cellulose.
   B. glycogen.
   C. monosaccharide.
   D. starch.
   E. none of the above

二、選擇題（均為單選，每題 2 分，答錯倒扣 0.5 分）

7. The most likely method for precipitating DNA from a tissue extract is by the addition of

   A. 1 N NaOH.
   B. ammonium sulfate.
   C. ethanol.
   D. phenol.
   E. trichloroacetic acid.

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8. According to the unified model for the controlling elements of a gene, the function of the general promoter for RNA synthesis can be defined as

   A. an initiator.
   B. a selector.
   C. a modulator.
   D. an enhancer.
   E. an activator.

9. Which of the following statements about the proto-oncogene is correct?

   A. Only the tumor cell contains the proto-oncogene.
   B. The gene in the genome of a retrovirus that is responsible for the cancer-causing ability of the virus is called proto-oncogene.
   C. Cell transformed with proto-oncogene will transform to be tumor cells.
   D. Cancer-causing gene that is present in the cell genome is called proto-oncogene. It is also called cellular oncogene.
   E. Cell with proto-oncogene and deficient in oncogene will transform to be tumor cells.

10. Which of the following statements about bacterial tryptophan(trp) operon is correct?

   A. The catabolite activator protein(CAP) is the corepressor.
   B. The trp operon has two kinds of regulation, one by an operator and the other by an attenuator.
   C. When trytophan is in short supply the leader sequence containing the attenuator cannot be passed and the stalled ribosome modifies the mRNA so that the structural genes are transcribed.
   D. The repressor complexs with the corepressor and on binding to the operator blocks transcription.
   E. None of the above

11. What is the defining feature possessed by RNA polymerase and not by DNA polymerase?

   A. RNA polymerase move along the template DNA in the direction of 3'— 5'.
   B. RNA polymerase move along the template DNA in the direction of 5'— 3'.
   C. RNA polymerase has nuclease activities.
   D. RNA polymerase does not need a primer during transcription.
   E. RNA polymerase promoters are downstream from the transcription start site.

三簡答題：

12.(2%) What kind of mutation is illustrated by each of the following amino acid sequences ?

   Wild type - Lys arg his his tyr leu.....
   Mutant I - Lys arg his his cys leu.....
   Mutant II - Lys arg ile ile ile.....
   Mutant III- Lys glu thr ser leu ser.....

13.(6%) For each of the following pairs of phases from the cell cycle, indicate how you could tell which of the two phases a specific cell is in

   A. G1 and G2
   B. G1 and S
   C. G2 and mitosis
   D. Mitosis and cytokinesis

14.(4%) When testosterone was injected into a female mouse early in pregnancy, all 12 of the offspring were male, matings between one of those males and another female resulted in female offspring only

   A. Why did the testosterone - injected mouse produce only male offspring ? Suggest two possible explanations.
   B. Explain why subsequent matings of one of these males produced only female mice.

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15. (6%) Indicate what effect each of the following poisons or drugs has on synaptic transmission and what effect each has on the polarization of the postsynaptic membrane.

A. The snake poison α-bungarotoxin.
B. The insecticide malathion.
C. Succinylcholine
D. The carbamoyl ester neostigmine.

16.(4%) A. Give possible explanations why a simply cloned eukaryotic gene will not usually yield functional mRNA in a bacterial host.
B. Assuming the problem in (A) is solved, give possible reasons why a desired protein may not be made by a eukaryotic gene cloned in a bacterium

17. Define or explain. (每題 2 分)

a. Okazaki fragments
b. Transgeneic mouse
c. Intron
d. Palindrome
e. pribnow box
f. Acrosomal reaction
g. Chromosome puff
h. Creatine phosphate
i. Peripheral nervous system

四問答題：

18. Monoclonal antibodies used in medicine and research are made in laboratories by means of tissue-culture techniques. Describe briefly the following:

A. (8%) Basic principles and procedures of hybridoma technology.
B. (2%) What is the reagent used to select hybridoma cells?

19. (6%) Describe the specific function of each of the following cellular organelles.

A. free ribosome
B. golgi complex
C. rough endoplasmic reticulum
D. smooth endoplasmic reticulum
E. mitochondrion
F. lysosome

20. (6%) How do cell membranes remain fluid?

21. (10%) Is the sodium-potassium pump an example of active transport? Why?

22. (6%) Describe the chemical components of the cell wall of gram-positive bacteria.

23. Define or explain.

a. (3%) cytoskeleton
b. (3%) desmosome