

考試科目	生物化學	所別	神經科學研究所	考試時間	2月27日(星期日)第一節
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A. Multiple-choice (3 points for each)

1. At pH 7.0, the side chain functional group of a lysine residue can act as a hydrogen bond donor. How many hydrogen bonds could it donate?
- 1
 - 2
 - 3
 - 4
 - 5
2. Which of the following amino acids contains a $-\text{CH}_2\text{-SH}$ group?
- cysteine
 - tyrosine
 - histidine
 - methionine
 - serine
3. Glycolysis activity is usually up-regulated by what ratio in most tissues?
- FADH_2/FAD
 - ATP/ADP
 - GTP/GDP
 - DNA/RNA
 - NAD^+/NADH
4. Which enzyme does not involve in NADH or GTP production in the TCA cycle?
- malate dehydrogenase
 - isocitrate dehydrogenase
 - succinate dehydrogenase
 - succinyl-CoA synthetase
 - α -ketoglutarate dehydrogenase
5. One cycle of TCA cycle produces ___ moles of NADH, ___ moles of FADH_2 , ___ moles of GDP.
- 2; 2; 1
 - 3; 1; 1
 - 1; 2; 2

請注意：背面還有試題。

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d. 0; 1; 2

e. 1; 3; 1

6. Gluconeogenesis occurs predominantly in

a. liver

b. muscles

c. fat cells

d. brain

e. heart

7. A reagent commonly used to cleave disulfide bonds in proteins is

a. dimethyl sulfoxide

b. 2-mercaptoethanol

c. urea

d. phenylisothiocyanate

e. ethidium bromide

8. Vitamin B12 contains which of the following metals?

a. copper

b. magnesium

c. calcium

d. cobalt

e. zinc

9. Which of the following molecules does not involve in DNA replication?

a. helicase

b. ligase

c. DNA polymerase

d. RNA primers

e. DNase I

10. Which of the following lipoproteins contains the highest level of triacylglycerols?

a. chylomicrons

b. VLDL

c. LDL

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- d. IDL
- e. HDL

B. Define the following terms (3 points of each)

1. Allosteric site
2. Electrophoresis
3. Frame shift
4. Restriction endonucleases
5. Transition state

C. Questions

1. Please describe N-linked and O-linked protein glycosylation. (10 points)
2. The mitochondrial electron-transfer chain is critical for the energy production. (a) What are the enzyme complexes? (b) What is Q cycle? (c) How does it work to generate ATP? (d) Please describe the structure of ATP synthase (F_0F_1 complex). (e) Please explain the binding-change model for ATP synthase. (25 points)
3. 2009 Nobel Prize in Physiology or Medicine was awarded to three U.S. scientists for the discovery of how chromosomes are protected by telomeres and the enzyme telomerase. (a) Please discuss the importance of telomeres and telomerase during the aging process and cancer formation. (b) Please explain how telomeres are replicated. (10 points)
4. Please describe how to prepare 200ml of 20mM PCPA (p-chlorophenylalanine) solution (pH=7.4). The molecular formula of PCPA is $C_9H_9ClNO_2$. (10 points)