

考生注意: 1. 依次序作答, 只要標明題號, 不必抄題。

2. 答案必須寫在答案卷上, 否則不予計分, 並限以藍黑色筆作答。

3. 試題隨卷繳回。(除請詳閱試場規則)

Biochemistry

Total 100 points

There are 10 questions, each question is 10 points.

- (A) What are the major differences between β -oxidation and α -oxidation? (4%)

(B) What is the role of peroxisomes in fatty acid oxidation? (3%)

(C) Why low density lipoproteins (LDL) are involved in the formation of atherosclerosis? (3%)
- (A) The yield of ATP from glucose oxidation is either 36 or 38 moles ATP/mol glucose. Please describe the rationales behind. (5%)

(B) Please describe the function of pyruvate carboxylase. (2%) If this enzyme is deleted from bacteria, does the bacteria still alive? Why? (3%)
- (A) Please explain why ingestion of low doses of acetylsalicylic acid (aspirin) may result in a mild bleeding tendency (5%).

(B) Please explain why alcohol excess can lead to hypoglycemia. (5%)
- (A) Please explain the mechanism of activation of glycogenolysis in liver via the action of epinephrine. (4%)

(B) Please explain the mechanism of activation of glycogenolysis in muscle via the action of epinephrine. (4%)

(C) Describe the molecular basis of the higher O_2 affinity of HbF compared with maternal HbA. Explain why this adaptation is necessary. (2%)
- Answer the following questions related to nucleotide.

(A) In Watson and Crick model of DNA, adenine form two hydrogen bonds with thymine, and cytosine form three hydrogen bonds with guanine. Please draw the structures of these pairings (3%), and explain why adenine can not pair with cytosine (4%).

(B) From which of amino acids does each of nitrogen atoms in the pyrimidine ring of nucleotide derive? (3%)
- (A) Imagine that you are attempting to identify a gene that you have mapped to a specific location on human chromosome 15. You have narrowed the region on this chromosome that contains this gene to a contiguous DNA fragment of about 450 kb. The 450-kb fragment is sequenced and you can now begin to identify the genes contained on this fragment. What are the types of sequence elements that will help you identify these regions? (5%)

國立暨南國際大學九十三年度碩士班研究生入學考試試題

第 2 節生物化學 適用:(生醫所生醫組 532)

(本試題共 2 頁, 第 2 頁)

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(B) What is plasmid copy number? Why is it important in plasmid selection? (3%)

(C) Why chloramphenicol is important in plasmid amplification? (2%)

7. Please draw the restriction map based on the following information: (10%)

Single and double digestions

Enzyme	Number of fragments	Sizes (kb)
<i>Xba</i> I	2	24.0, 24.5
<i>Xho</i> I	2	15.0, 33.5
<i>Kpn</i> I	3	1.5, 17.0, 30.0
<i>Xba</i> I+ <i>Xho</i> I	3	9.0, 15.0, 24.5
<i>Xba</i> I+ <i>Kpn</i> I	4	1.5, 6.0, 17.0, 24.0

Partial digestion

Enzyme	Fragment sizes (kb)
<i>Kpn</i> I	1.5, 17.0, 18.5, 30.0, 31.5, 48.5

8. (A) What is the role of rho-protein in RNA transcription? (2%) What enzyme activity does rho have, and why is this activity required for it to perform its function in transcription? (3%)

(B) What is ribozyme? (3%)

(C) Define nick translation of DNA. (2%)

9. (A) Please compare and contrast the benefits and limitations of PCR versus cell-based DNA amplification. (3%)

(B) Some times PCR can yield either no products or many products (not necessarily including the one you want!). Why may this occur and what simple steps can you take to prevent this from repeats. (3%)

(C) List 5 ways of altering gene transcription. (4%)

10. (A) If you were developing a new antibiotic that specifically targeted bacterial protein synthesis as its mode of action, what enzymes, structures, or molecules would be likely targets? (3%)

(B) Fluorocytosine and aminopterin are potent antimicrobial agents. Please explain the mechanism behind them. (4%)

(C) Describe the biochemical basis for chemotherapeutic treatment with fluorodeoxyuridylate (FdUMP). (3%)