國立臺北科技大學 100 學年度碩士班招生考試

系所組別:3713 有機高分子研究所甲組

第二節 生物化學 試題 (選考)

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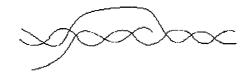
注意事項:

- 1. 試題 1~5 共 5 題, 每題 10 分, 配分共 50 分。
- 2. 試題 6~12 共 7 題, 每題 5 分, 配分共 35 分。
- 3. 試題 13 共 1 題,配分共 15 分。
- 4. 請標明大題、子題編號作答,不必抄題。
- 5. 全部答案均須在答案卷之答案欄內作答,否則不予計分。
- 1. The template strand of a segment of double-stranded DNA contains the sequence: 10p (5)CTT TGA TAA GGA TAG CCC TTC
- (a) What is the base sequence of the mRNA that can be transcribed from this strand?
- (b) What amino acid sequence could be coded by the mRNA base sequence in (a)

of codon							
υυ υ				A		G	
	Phe	ยดย	Ser	UAU	Tvr	บอบ	Cys
UUC	Phe	UCC	Ser	UAC	Týr	UGC	Cýs
						l	_
AUU	Leu	UCA	Ser	UAA		UGA	
UUG	Leu	UCG	Ser	UAG	Stop	UGG	Tep
CUU	Leu	ccu	Pro	CAU	His	CGU	Arg
CUC	Leu	cce	Pro	CAC		CGC	Arg
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CUA	Leu	CCA	Pro	CAA	Gin	CGA	Arg
CUG	Leu	CCG	Pro	CAG	Gin	CGG	Arg
AUU	lle	ACU	Thr	AAU	Asn	AGU	Ser
AUC	ile	ACC	Thr	AAC	Asn	AGC	Ser
AUA	lle	ACA	Thr	AAA	Lys	AGA	Arg
AUG	Met	ACG	The	AAG	Lys	AGG	Āīg
GUU	٧al	GCU	Ala	GAU	Asp	GGU	Giv
GUC	Val	GCC	Ala	GAC	Asp	GGC	Gly

- **2.**Two reactions in glycolysis produce ATP. For each of these, show the name and structure of reactant and product, indicate which cofactors participate and where, and name the enzymes.
- **3.** CO₂ is produced in two reactions in the citric acid cycle. For each of these reactions, name and show the structures of reactant and product, name the enzyme, and show how any cofactors participate.
- **4.** Describe the five major groupings of amino acids, and utilze one amino acid per group to build a pentapeptide chain.
- 5. Describe polymerase chain reaction (PCR) principles and procedure in detail.
- **6.** Explain in molecular terms why humans cannot use cellulose as a nutrient, but goats and cattle can.

- 7. What are lectins? What are some biological processes which involve lectins?
- 8. The scheme $S \to T \to U \to V \to W \to X \to Y$ represents a hypothetical pathway for the metabolic synthesis of compound Y. The pathway is regulated by feedback inhibition. Indicate where the inhibition is most likely to occur and what the likely inhibitor is.
- 9. Describe three of the important features of the α -helical polypeptide structure predicted by Pauling and Corey. Provide one or two sentences for each feature.
- 10. Describe three of the important features of a β sheet polypeptide structure. Provide one or two sentences for each feature.
- 11. Below, an RNA molecule is being transcribed from a strand of DNA. Indicate the 5' and 3' ends of the RNA molecule and of the strand of DNA that is complementary to the RNA molecule. In which direction is synthesis occurring?



- 12. What is meant by endosymbiotic association? How can this concept explain the evolution of eukaryotic cells that are capable of carrying out photosynthesis and/or aerobic metabolism?
- 13. Define the following items 解釋名詞 (3 分/小題 共 15 分)
 - a. exonuclease
 - b. protease
 - c. type II restriction endonucleases
 - d. sticky ends
 - e. RNA polymerase