

國立成功大學

112學年度碩士班招生考試試題

編 號： 61

系 所： 生物科技與產業科學系

科 目： 分子生物學

日 期： 0207

節 次： 第 2 節

備 註： 不可使用計算機

※ 考生請注意：本試題不可使用計算機。 請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

簡答題 (12 題, 共 88 分):

1. Which types of RNA are transcribed by eukaryotic RNA polymerase I, II, and III (6 points)? Please also describe the locations for the transcription of each type of RNA (6 points).
2. Please describe the initiation of transcription directed by eukaryotic RNA polymerase II. (6 points)
3. What are the three major functions of enhancer-binding TF and their functions? (6 points)
4. What is the definition of epigenetic? (6 points)
5. Please list two DNA binding domain. (4 points)
6. What are the two major modification of histone? (4 points)
7. Please describe two types of transcription termination in prokaryotic cells (4 points). Describe their mechanism of actions. (6 points)
8. Please describe the structure of the CTD domain of RNA polymerase II (2 points). Describe 2 phosphorylation sites (2 points) and their involvement/mechanisms in the RNA processing (6 points).
9. Please describe the intron and exon (2 points). RNA splicing is an important step in transcription. Please describe the mechanisms of RNA splicing, including the proteins/enzymes and the site of splicing (6 points).
10. Design an experiment to show the binding site of a transcription factor (5 points).
11. DNA methylation is an important epigenetic regulation, please describe how to identify the sites of methylation through sequencing (5 points)?
12. (1) Write down the complementary strand of the following DNA (2 points).
5'-AATGCACGGTGCTAAGTTGCACCGTTAA-3'
(2) Transcribe the DNA into a single strand mRNA using the above strand as the template (2 points).
(3) Do you think this mRNA have secondary structure? Why yes or why not (3 points)?
(4) Translate the mRNA with 3 different frames using the codon chart (3 points). Which frame will you select and why (2 points)?

		Second letter				
		U	C	A	G	
First letter	U	UUU } Phe UUC } UUA } Leu UUG }	UCU } Ser UCC } UCA } UCG }	UAU } Tyr UAC } UAA Stop UAG Stop	UGU } Cys UGC } UGA Stop UGG Trp	U C A G
	C	CUU } Leu CUC } CUA } CUG }	CCU } Pro CCC } CCA } CCG }	CAU } His CAC } CAA } Gln CAG }	CGU } Arg CGC } CGA } CGG }	U C A G
	A	AUU } Ile AUC } AUA } AUG Met	ACU } Thr ACC } ACA } ACG }	AAU } Asn AAC } AAA } Lys AAG }	AGU } Ser AGC } AGA } Arg AGG }	U C A G
	G	GUU } Val GUC } GUA } GUG }	GCU } Ala GCC } GCA } GCG }	GAU } Asp GAC } GAA } Glu GAG }	GGU } Gly GGC } GGA } GGG }	U C A G

選擇題 (3 題, 共 12 分): Select single answer from these questions (4 points each).

- For the RNA capping, which of the following is true? (a) 5' capped to 3' RNA; (b) 3' capped to 5' RNA; (c) 5' capped to 5' RNA; (d) 3' capped to 3' RNA
- Regarding to the quantity, which RNA polymerase in eukaryotic cell makes the most RNA? (a) RNA polymerase I; (b) RNA polymerase II; (c) RNA polymerase III; (d) RNA polymerase IV
- In the transcription of prokaryotic cells, which is FALSE? (a) one gene in one transcription unit; (b) translation is immediately happened after transcription; (c) sigma factor is a part of Holo enzyme; (d) sigma factor can regulate initiation.