

中山醫學大學 101 學年度碩士班入學招生考試試題

生物醫學科學學系碩士班 (甲組)

考試科目：分子生物學

時間：80 分鐘

※請注意本試題共(3)張，如發現頁數不足，應當場請求補齊，否則缺頁部份概以零分計算。 第 (1) 頁

本試題共 四大題，總分 100 分。

一、選擇題：(每題 3 分) (30%)

1. In prokaryotes, groups of genes may be clustered and transcribed together. Such clusters are called (A) Promoters (B) Operators (C) Centromeres (D) Operons.
2. Which of the eukaryotic RNA polymerases contains a specific C-terminal domain (CTD) that can be phosphorylated and can interact with many proteins that are involved in posttranscriptional modification (A) RNA polymerase I (B) RNA polymerase II (C) RNA polymerase III (D) all of the above
3. The polymerase chain reaction (A) is a method for sequencing DNA. (B) is used to transcribe specific genes. (C) amplifies specific DNA sequences. (D) does not require DNA replication primers.
4. Translation of messenger RNA into protein occurs (A) in a 3'-to-5' direction and from N terminus to C terminus. (B) in a 5'-to-3' direction and from N terminus to C terminus. (C) in a 3'-to-5' direction and from C terminus to N terminus. (D) in a 5'-to-3' direction and from C terminus to N terminus.
5. DNA double helix (A) the two strands are held together by hydrogen bonds between complementary bases (B) the two strands are parallel (C) ribose-phosphate backbone(核糖磷酸骨幹) is at the inside of the helix (D) All of the above
6. If a double-stranded DNA molecule contains 29% A, can you determine the percentage of the rest of the bases? (A) No, not enough information. (B) Yes, but can only determine T as 29%. (C) Yes, T is 21%, G is 21% and C is 29%. (D) Yes, T is 29%, G is 21% and C is 21%.
7. DNA replication in eukaryotes differs from replication in bacteria because (A) there are many replication origins in each eukaryotic chromosome and only one in bacterial DNA. (B) synthesis of the new DNA strand is from 5' to 3' in eukaryotes and from 3' to 5' in bacteria. (C) synthesis of the new DNA strand is from 3' to 5' in eukaryotes and from 5' to 3' in bacteria. (D) Okazaki fragments are produced in eukaryotic DNA replication but not in prokaryotic DNA replication.
8. For a plasmid to stay within the bacterial cells, it must (A) be integrated into the bacterial chromosome. (B) have an origin of replication. (C) have a antibiotic resistant

中山醫學大學 101 學年度碩士班入學招生考試試題

生物醫學科學系碩士班 (甲組)

考試科目：分子生物學

時間：80 分鐘

※請注意本試題共(3)張，如發現頁數不足，應當場請求補齊，否則缺頁部份概以零分計算。 第 (2) 頁

gene (D) have an R factor.

9. cyclic AMP (cAMP) is a (A) secondary messenger (B) receptor (C) protein kinase (D) membrane protein.
10. Which of the following statement about telomere and telomerase is FALSE (A) telomerase is present at germ cells. (B) telomeres get longer after every cell division (C) telomerase can lengthen telomere (D) all of the above

二、是非題 (每題 2 分) (10%)

1. In eukaryotic genes, introns are usually larger than exons.
2. mRNA are usually larger than pre-mRNA.
3. If both DNA fragment A and B are 350 base pair long. The GC content of fragment A is 54% and the GC content of fragment B is 45%. Then fragment A denatures at higher temperature than fragment B.
4. DNA methylation usually activates gene expression.
5. Pyrimidine dimers formed between adjacent pyrimidines are caused by UV radiation and can block DNA replication and transcription

三、解釋名詞 (每題 6 分) (30%)

1. miRNA
2. ribozyme
3. cDNA (complementary DNA)
4. chromatin immunoprecipitation (ChIP)
5. mutation

四、簡答題 (30%)

1. Please describe briefly the major contributions of James Watson and Francis Crick for Molecular Biology. (10%)

中山醫學大學 101 學年度碩士班入學招生考試試題

生物醫學科學系碩士班 (甲組)

考試科目：分子生物學

時間：80 分鐘

※請注意本試題共(3)張，如發現頁數不足，應當場請求補齊，否則缺頁部份概以零分計算。 第 (3) 頁

2. If the laboratory of your future graduate advisor just cloned a novel zebrafish gene “fishy” and you want to study the gene. The DNA sequence of the **template strand** from transcription start site of the “fishy” gene is as following: 3’-AGGAG GATGC ATGCT TCGTT CAACC TGGTA CTCCT TTACG AATGG CCATA -5’ (only the first 50 nucleotide sequence is shown here)

(A) Please put down the mRNA sequence of the “fishy” gene. (from 5’ end). (5%)

5’-

(B) From the mRNA sequence in question 2, please put down the first four amino acid sequence that is translated from the mRNA. (please use the codon table provided at the end) (5%)

(C) If your advisor want you to study the unknown function of the “fishy” gene, please suggest the experiments you can do and briefly explain why. (10%)

		Second letter					
		C	A	G			
First letter	U	UUU Phenyl-alanine UUC	UOU Serine UCC UCA UCG	UAU Tyrosine UAG	UGU Cysteine UGC	Third letter U C A G U C A G U C A G U C A G	
		UUA Leucine UUG		UAA Stop codon UAG Stop codon	UGA Stop codon UGG Tryptophan		
	C	CUU Leucine CUC CUA CUG	CCU Proline CCG CCA CCG	CAU Histidine CAG	CGU Arginine CGC CGA CCG		
		AAU Isoleucine AUC AUA AUG Methionine; start codon	ACU Threonine ACC ACA ACG	AAU Asparagine AAC	AGU Serine AGC AGA Arginine AGG		
G	GUU Valine GUC GUA GUG	CCU Alanine CCG CCA CCG	GAU Aspartic acid GAC GAA Glutamic acid GAG	GGU Glycine GGC GGA GGG			