國立彰化師範大學 100 學年度碩士班招生考試試題

系所： 生物學系　　**組別：** 乙組　　**科目：** 分子生物學

☆☆請在答案紙上作答☆☆　　

一、簡答題：

1. 何謂 Post-translational modification (PTM)？請列舉出三種不同類型的 PTM；針對每一類型 PTM，舉出一實例，並說明該類型 PTM 的功能。(10%)
2. 真核細胞的轉譯作用中有哪些特徵可提高蛋白質合成速率？(10%)
3. 簡述 RNA interference (RNAi) 機制，並說明細胞內生性 RNAi 機制可能之功能。並舉例說明 RNAi 在生物技術上的應用。(10%)
4. What are gene's **regulatory elements**? Define them and give each an example. (10%)
5. Describe the replication process in synthesizing the lagging strand of DNA in *E. coli*. (10%)

二、 名詞解釋 (每小題 4%)

1. *Gene knock-out*
2. *Paracrine signaling*
3. *Receptor-mediated endocytosis*
4. *Genomics*
5. *Translation initiation complex*

三、選擇題(每小題 3%)

1.Which of the following is not true in *E. coli*?

(a) The role of α subunit of RNA polymerase is binding of template DNA.
(b) *Eco*R1 is a type II restriction endonuclease; its recognition site is GAATTC.
(c) The Rho-independent termination signal is a stretch of 30-40 bp sequence, consisting of many GC residues followed by a series of T.
(d) The helicase activity for initiation of transcribing genes is performed by σ factor.

2. Which of the following is not true regarding homeotic genes?

(a) Their products contain a "homeo" domain with conserved 60 amino acid sequences.
(b) They were original identified to play a critical role in fly development.
(c) They are actually transcription factors with a helix-loop-helix DNA binding domain.
(d) None of the above

3.Which of the following combination of transcription factors can assist RNA polymerase I, II, and III to reach promoter?

(a) SL1, TFIIF, TFIIIB,
(b) SL1, TFIID, TFIIIB,
(c) UBF, TFIIF, TFIIIC,

(d) UBF, TFIIF, TFIIIB,

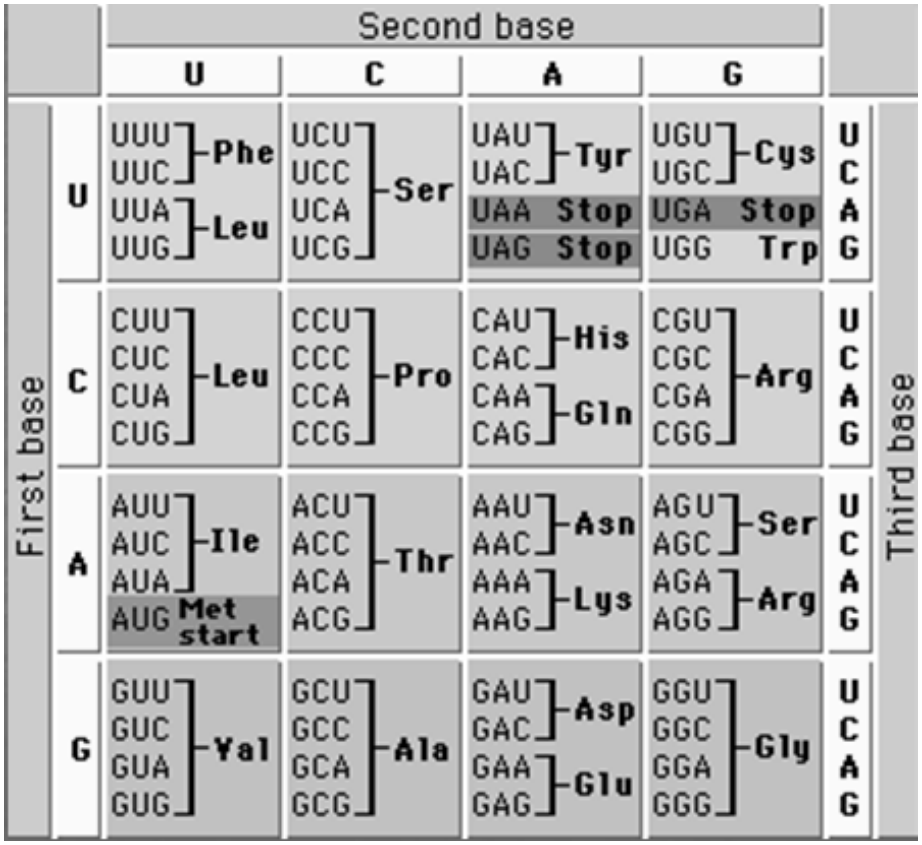
4.Watson and Crick (1953) proposed a molecular model for DNA in which

(a) DNA is double helix, and a turn of helix is 34 nm.

(b) The diameter of DNA is constant so that bases of nucleotides should face outward.

(c) G should pair with C, and A should pair with T.

(d) All of the above



5.Using the genetic code in the genetic table above, identify a possible 5'to 3' sequence of nucleotides in the DNA template strand for an mRNA coding for the polypeptide sequence **Phe- Pro- Lys**.

(a) UUU- GGG- AAA

(b) GAA- CCC- CTT

(c) AAA- ACC- TTT

(d) CTT- CGG- GAA

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6.The figure above is the result of DNA fingerprinting, in which DNA was cut with _____ to result in various sizes of DNA
(a) exonuclease (b) restriction enzyme (c) phosphatase (d) kinase

7.Which of the following RNAs is not transcribed by RNA polymerase III in eukaryotes?
(a) tRNA (b) 5.8S rRNA (c) 5S rRNA (d) snRNA

8.Which of the following is not true of *trp* operon in *E. coli*?
(a) It is a repressible operon involved in catabolism.
(b) It involves one repressor gene and five structural genes.
(c) The tryptophan is an co-repressor of the operon.
(d) A sequence located between the operator and the first structural gene *trp*E is called attenuator, which controls the movement of RNA polymerase depending upon the presence or absence of tryptophan.

9.Which of the following has no phenomenon of “polymorphism”?
(a) microsatellite DNA (b) alphoid DNA (c) isozymes (d) restricted DNA fragments

10.Which of the following is true concerning the eukaryotic TATA box?
(a) It is 10 bp upstream from the start of transcription initiation.
(b) It binds to UBF1 in genes transcribed by RNA polymerase I.
(c) It binds TFIIIB in genes transcribed by RNA polymerase III.
(d) Its consensus sequence is TATATA.