

國立中央大學100學年度碩士班考試入學試題卷

所別：生命科學系碩士班分子與環境生物學組(一般生) 科目：生物化學II (含分生) 共3頁 第 / 頁
 本科考試禁用計算器 *請在試卷答案卷(卡)內作答

一. 配合題 (每題 3 分; 15 題; 共 45 分)

1~10. Match the following items with their correct descriptions.

- _____ 1. The large RNA-protein body that removes introns during the processing of mRNA.
- _____ 2. A group of genes coordinately controlled by a regulator.
- _____ 3. An RNA molecular that is complementary to messenger RNA.
- _____ 4. A molecule that is made from the corresponding mRNA by using reverse transcriptase.
- _____ 5. DNA sequences can strongly stimulate transcription of a gene or genes, and can function efficiently at large distances from the promoter elements, both upstream and downstream of the promoter and in either orientation.
- _____ 6. A binding site for a transcription factor that guides RNA polymerase II to the promoter in eukaryotes.
- _____ 7. A ribosome binding site in bacteria.
- _____ 8. A special type of sequence tagged site (STS) generated by amplifying cellular mRNA by RT-PCR.
- _____ 9. A part of DNA polymerase I that lacks 5'→3' exonuclease activity.
- _____ 10. Having only a single copy of each chromosome or gene.

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| (A) open reading frame (ORF); | (B) haploid; | (C) O region; |
| (D) Klenow fragment; | (E) operator; | (F) antisense RNA; |
| (G) Shine-Dalgarno (SD) sequence; | (H) clones; | (I) TATA box; |
| (J) expressed sequence tag (EST); | (K) Holliday junction; | (L) Okazaki fragments; |
| (M) internal ribosome entry sequence (IRES); | (N) G protein; | (O) promoter; |
| (P) cDNA; | (Q) enhancer; | (R) transcription factor; |
| (S) spliceosome; | (T) operon; | (U) D loop; |
| (V) untranslated region (UTR); | (W) hairpin; | (X) euchromatin; |
| (Y) regulon; | (Z) silencer | |

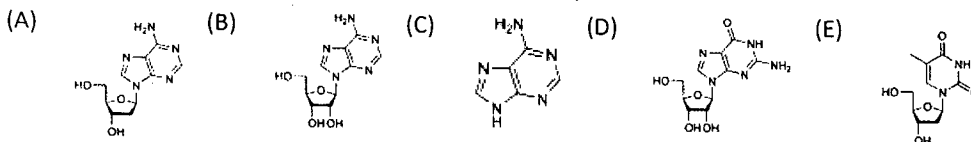
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11~15 Match the following eukaryotic translation initiation factors with their correct functions.

- (A) eIF1; (B) eIF2; (C) eIF4A; (D) eIF4E; (E) eIF3
- _____ 11. This initiation factor is involved in the processes of tRNA binding to the ribosome.
 - _____ 12. This initiation factor inhibits re-association of the small and large subunits of ribosome.
 - _____ 13. This initiation factor is a Cap binding protein.
 - _____ 14. This initiation factor has RNA helicase activity.
 - _____ 15. This initiation factor aids in ribosome scanning to locate the initiation codon.

二. 選擇題 (每題 3 分; 16 題; 共 48 分)

_____ 1. Which one is the correct structure of a deoxyadenosine?



_____ 2. Which of the following scientist provided a direct physical demonstration of DNA recombination?

- (A) James Watson; (B) Thomas Hut Morgan; (C) Rosalind Franklin; (D) Stanley Cohen; (E) Barbara McClintock

_____ 3. Which of the following enzymes is responsible for bacterial DNA replication?

- (A) DNA polymerase I; (B) DNA polymerase II; (C) DNA polymerase III; (D) DNA kinase; (E) DNase I

注：背面有試題

- ___ 4. Which of the following steps is in correct order for transcription initiation in bacteria?
- (A) Forming the open promoter complex→ Forming the closed promoter complex→ Incorporating the first few nucleotides→ Promoter clearance
- (B) Forming the closed promoter complex→ Incorporating the first few nucleotides→ Forming the open promoter complex→ Promoter clearance
- (C) Forming the closed promoter complex→ Forming the open promoter complex→ Incorporating the first few nucleotides→ Promoter clearance
- (D) Forming the open promoter complex→ Incorporating the first few nucleotides→ Forming the closed promoter complex→ Promoter clearance
- (E) Forming the closed promoter complex→ Forming the open promoter complex→ Promoter clearance→ Incorporating the first few nucleotides
- ___ 5. Which of the following is not true for DNA cloning?
- (A) Plasmids are small and circular DNAs that are independent of the host chromosome.
- (B) All gene cloning experiments require such carrier, which we call vectors to allow replication of recombinant DNA.
- (C) Typical vectors have single sites for one or more restriction enzymes that allow them to replicate independently of the chromosome of the host.
- (D) Bacteriophage is nature vectors that transduce bacterial DNA form one cell to another.
- (E) Phagemids have characteristics of both phages and plasmids.
- ___ 6. Which one of the following statements about mRNA is not true?
- (A) Pre-mRNA splicing occurs in the nucleus.
- (B) Pre-mRNA processing begins during transcription.
- (C) Uncapped mRNA is much more stable then capped mRNA.
- (D) Poly(A) tails are added to the 3' end of the mRNA molecule.
- (E) Gene transcription by RNA polymerase II usually stops at the polyadenylation site.
- ___ 7. Which one of the following methods cannot be used to study DNA-Protein interaction?
- (A) DNase footprinting
- (B) Polymerase chain reaction
- (C) Chromatin immunoprecipitation
- (D) Yeast One-hybrid
- (E) Gel Mobility Shift assay
- ___ 8. What do you need to syntheses a DNA fragment *in vitro*?
- (A) DNA temple, primer, dNTP and DNA polymerase
- (B) DNA temple, dNTP and DNA polymerase
- (C) DNA temple, primer, dNTP, DNA ligase
- (D) RNA temple, primer, dNTP and RNA polymerase
- (E) DNA temple, primer, dNTP, Restriction endonucleases
- ___ 9. Which one of the following is not true for histones?
- (A) The mass of histones in eukaryotic nuclei is equal to the mass of DNA.
- (B) Histones are usually acid and have pronounced negative charge at neutral pH.
- (C) Most of the histones are also well conserved from one organism to another.
- (D) Acetylation of histones correlates with gene activity.
- (E) Acetylation occurs on the amino groups on lysine side chains..

參考用

注意：背面有試題

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10. What are three general classes of activation domains found in eukaryotic transcription factors?
- (A) Zinc-containing modules, Acidic domains and proline-rich domains.
(B) Homeodomains, bZIP and bHLH motifs and Glutamine-rich domains.
(C) Zinc-containing modules, bZIP and bHLH motifs and Glutamine-rich domains.
(D) Acidic domains, Glutamine-rich domains and proline-rich domains.
(E) Zinc-containing modules, bZIP and bHLH motifs and Homeodomains.
11. Which of the following statement is not true for gene expression?
- (A) Transcription and translation are two main steps in gene expression.
(B) Gene expression can be controlled at post-transcription level.
(C) Cellular mRNA levels of a gene are determined by transcription.
(D) Chromatin remodeling correlates with gene activity.
(E) Transcription factors can regulate gene expression.
12. Which of the following is not true for RNA interference?
- (A) RNAi is a mechanism for gene silencing that is induced by double-stranded RNA.
(B) RNAi is a defense mechanism against viruses.
(C) Dicer is ribonuclease that cleaves double-stranded RNA into segments of 51-53 bp.
(D) RNAi is found in protozoa, invertebrates, mammals and plants.
(E) The siRNA can be amplified via RNA-dependent RNA polymerase.
13. Please put the following steps of Cap synthesis into the correct order.
- (1) N⁷ of the capping guanine is methylated
(2) The terminal phosphate is removed from the pre-mRNA
(3) A capping GMP is added to the pre-mRNA
(4) The 2'-O-methyl group of the penultimate nucleotide is methylated.
- (A) 2-3-1-4; (B) 2-4-3-1; (C) 3-4-1-2; (D) 4-3-1-2; (E) 4-1-3-2
14. Which one of the following statements about transposons is not true?
- (A) Transposable elements or transposons are DNA fragments that can move from one genomic location to another.
(B) A gene mutation can be created by a transposable element insertion.
(C) The first eukaryotic transposable element is found in maize.
(D) The Ds transposable element of maize cannot transpose on its own because it lacks inverted repeats.
(E) Transposable elements have been found in all kinds of organisms.
15. Which of the following antibiotics does not inhibit protein synthesis by binding to the ribosome?
- (A) chloramphenicol
(B) streptomycin
(C) tetracycline
(D) erythromycin
(E) ampicillin
16. Which one of the following statements about splicing is not true?
- (A) The first two bases and the last two bases in the splicing signal consensus sequence are GU-AG.
(B) Alternative splicing patterns can lead to the production of different protein products from the same gene.
(C) Base pairing between the 5' splice site and U1 snRNA is essential for splicing.
(D) U2 base pairs with the conserved sequence at splicing branch point.
(E) U5 base pairs with U6 until U6 is needed in the splicing reaction.

參考用

三. 問答題 (7分)

1. Please make a comparison between RT-PCR with PCR? What purpose do research people use RT-PCR?