

國立成功大學
110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： 0203

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。

一、單選題: (60%，每題 2.5 分)

- (1) - A chromosome is best defined as:
(A) the complete sequence of a gene, including sequences removed from the RNA product.
(B) the functional coding sequences of a single DNA molecule.
(C) the complete set of hereditary information of an organism.
(D) a linear array of genes.
(E) the sequence of a gene that has coding information for the polypeptide product.
- (2) - _____ are a special class of eukaryotic miRNAs that are active in germ cells.
(A) CRISPRs. (B) CUTs. (C) piRNAs (D) siRNAs. (E) sRNAs.
- (3) - RNA generally functions as a regulator by:
(A) base-pairing with a single-stranded region. (B) influencing ribosomal activity.
(C) recruiting proteins to gene promoters. (D) catalyzing biochemical reactions.
(E) participating in chromatin remodeling
- (4) - Which of the following sequences is inversely palindromic?
(A) 5' GCATGC 3' (B) 5' GCAACG 3' (C) 5' GCAT 3'
(D) 5' GCAACGC 3' (E) 5' GGAAAAGG 3'
- (5) - In a plasmid vector, the purpose of the lacZ gene is:
(A) to allow replication of the plasmid.
(B) to allow selection of transformed bacterial cells.
(C) to allow the plasmid to be cut once for cloning a fragment.
(D) to protect the plasmid from digestion by exonucleases.
(E) as an indicator that the plasmid is recombinant, containing a DNA insert
- (6) - In many multicellular eukaryotic genes, different polypeptides can be produced from the same stretch of DNA duplex primarily due to:
(A) genes found within the introns of a larger gene.
(B) alternative splicing of the mRNA transcript.
(C) extensive somatic recombination in individual cells.
(D) multiple open reading frames in the same sequence.
(E) different genes on the two complementary strands.
- (7) - All _____ are maternally inherited.
(A) plant mitochondrial genes (B) plant nuclear genes (C) animal mitochondrial genes
(D) animal nuclear genes (E) plant chloroplast genes

- (8) The core histones do not include:
(A) H1. (B) H2A. (C) H2B. (D) H3. (E) H4.
- (9) An activator that does not have an activating domain:
(A) must directly interact with RNA polymerase. (B) must also not have a DNA-binding domain.
(C) may require a coactivator with an active domain. (D) is mutant and cannot activate a gene.
(E) is called a repressor.
- (10) Which statement best describes the relationship between methylation and gene activity?
(A) DNA methylation is generally associated with transcriptional inactivity.
(B) DNA methylation is generally associated with translational inactivity.
(C) DNA methylation is generally associated with transcriptional activity.
(D) Histone methylation is generally associated with transcriptional inactivity.
(E) Histone methylation is generally associated with transcriptional activity.
- (11) The wobble hypothesis states that:
(A) codon-anticodon pairing must only follow the standard base-pairing rules at the first two codon positions.
(B) some mutations introduce termination codons.
(C) most amino acids have more than one codon representing them.
(D) an mRNA may encode more than one polypeptide, and the ribosome may "wobble" or begin at alternate start codons.
(E) mutations are less likely to occur at the third base of the codon.
- (12) The ribosomal E site:
(A) binds aminoacyl-tRNA. (B) binds the peptidyl-tRNA.
(C) binds the Shine-Dalgarno sequence. (D) transiently binds deacylated tRNA.
(E) binds the mRNA start codon.
- (13) The stem-loop structure at the 3' end of a bacterial mRNA functions primarily in:
(A) termination of translation. (B) regulating the frequency of translation.
(C) termination of transcription. (D) mRNA stability. (E) mRNA transport.
- (14) U1 snRNA has a single-stranded 5' end that is able to base-pair with the:
(A) 5' cap. (B) branch site. (C) 3' splice site. (D) 5' splice site. (E) promoter
- (15) snoRNAs are required for:
(A) processing and modification of rRNAs. (B) 3' mRNA polyadenylation.
(C) processing and modification of tRNAs. (D) pre-mRNA splicing.
(E) 5' mRNA capping.

- (16) Eukaryotic RNA polymerase II synthesizes:
(A) 5S rRNA. (B) 28S rRNA. (C) mRNA. (D) 18S rRNA. (E) tRNAs.
- (17) An enhancer _____ the gene it affects.
(A) must be upstream from (B) can be very distant from
(C) cannot be within an intron of (D) must be in the same orientation as
(E) must be downstream from
- (18) Which of the following is relatively unimportant for the recognition of the promoter by sigma factor?
(A) The -35 element (B) The length of the region between the -10 and -35 elements
(C) The -10 element (D) The sequence surrounding the startpoint
(E) The sequence of the region between the -10 and -35 elements
- (19) Rearrangement of host DNA may result from:
(A) replicative transposition. (B) unequal crossing over between transposon copies.
(C) nonreplicative transposition. (D) reverse transcription and integration of retrotransposons.
(E) homologous recombination between transposon copies.
- (20) What percentage of the human genome codes for the amino acids in our proteins?
(A) 15% (B) 23% (C) about 1.5% (D) about 7.5% (E) 70%
- (21) A replication bubble:
(A) is present if replication is unidirectional.
(B) is flanked by regions of nonreplicated DNA.
(C) contains DNA that is currently being replicated or already has been replicated.
(D) is present if replication is bidirectional.
(E) All of these are correct.
- (22) The following recombination frequencies were found for four genes (A, B, C and D) on the same chromosome: between genes A and B - 45%, between genes C and D - 10%, between A and D - 7%, between genes C and B - 18%, between genes C and A - 17%, and between genes B and D - 28%. What was the order of the genes on the chromosome?
(A) A - B - C - D (B) B - A - C - D (C) A - D - C - B
(D) A - C - D - B (E) C - A - D - B
- (23) The 3' end of most eukaryotic mRNAs contains a _____, while the 5' end has a _____.
(A) poly(A) tail, methylated guanosine cap
(B) poly(U) tail, methylated guanosine cap
(C) methylated guanosine cap, poly(A) tail
(D) poly(A) tail, sulfonated guanosine cap

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(24)、Proteomics is defined as the _____.

- (A) linkage of each gene to a particular protein
- (B) study of the full protein set encoded by a genome
- (C) totality of the functional possibilities of a single protein
- (D) study of how amino acids are ordered in a protein

二、問答題 (40%。每題 10 分)

1. Please define what is a gene? Which included how many elements in single gene? (10 points)
2. What is siRNA (RNA interference) approach? Please describe siRNA is how to work and how to knockdown the gene expression? (10 points)
3. If you want to knockout P53 gene from zebrafish genome what do you do? (10 points)
4. Please describe what is an autophagy? It plays what kind of biological functions within cell? (10 points)