



Answer sheet for Final Exam

(Applied Biology 427 Z)

Exam Date: 26 Jan 2016

4th year Biotechnology

Exam time: 1hour

Answer of the first Question:

Mark right (✓) or wrong (✗) and correct the false sentence and explain why.

- 1- (X) In the zinc fingers motif, the spacing of the helical segments is performed by B-sheet.
- 2- (X) When foreign DNA and plasmid are both cut with the same restriction enzyme and mixed together, not all molecules will form recombinants.
- 3- (X) Assembly of basal transcription factors in Eukaryotes begins at the TATA sequence in the Promoter.
- 4- (X) Low stringency condition in western blotting can detect Homologous DNA fragment.
- 5- (X) If host cell is ampicillin sensitive and are plated in medium containing ampicillin, only cells have taken up ampicillin resistant vector.

Answer of Second Question: Complete the following sentences:-

- 1- Proteins that block the passage of RNA polymerase are called Repressor
- 2- **High** stringency conditions, it means Very high Temperature and low salt concentration which used to detect exact (identical) DNA fragment in Southern blotting.
- 3- When tryptophan is present in the environment of E. coli, the tryptophan binds to the trp repressor
- 4- The method can be used to detect in vivo DNA-protein interaction immunoprecipitation assay
- 5- All fragments cut by most restriction endonucleases have complementary single strands ends (sticky ends)

Answer of Third Question: Choose the correct answer

1- Which of the following can physically block interactions between promoter DNA sequences and the proteins needed to initiate transcription?

- a) RNA b) nucleosome c) HO gene **d) Histone proteins** e) histone acetyltransferase

2- a promoter site on DNA.....

- a) **Initiates transcription** b) Regulates termination c) Codes for RNA
d) Transcribes repressor

3- A form of binding motif containing a nearly identical sequence of 60 amino acids in many eukaryotes is the

- a) **Homeodomain motif** b) Zinc finger motif c) leucin zipper motif d) universal motif

4- In the discovery of introns, a DNA molecule called..... was formed that had the same nucleotide sequence as the gene that produced the mRNA.

- a) mDNA b) rDNA c) sDNA **D) cDNA**

5- All of the following can be found in a human transcription complex except

- a) Activator b) **RNA** c) enhancer d) silencer

6- When tryptophan is present in the medium, the transcription of tryptophan producing genes in E. coli is stopped by a helix-turn-helix regulator binding to the

- a) Trp repressor b) trp operon **c) trp promoter** d) trp operator

7- In the function of the lac operon in E. coli, the lac genes are transcribed in the presence of lactose because

- a) RNA polymerase binds to the operator b) the repressor cannot bind to the promoter
c) **an isomer of lactose binds to the repressor** d) CAP does not bind to the operator

8- Clones are identified by hybridizing them with

- a) A vector b) an antibody c) a virus **d) a probe**

9- A probe is used in which stage of the gene transfer process?

- a) Cleaving DNA b) recombining DNA c) cloning **d) screening**

10- In an operon the location of the regulatory region occurs _____ the structural genes.

- a) After b) within **c) before**

Fourth Question:

- a) **Mention in detail a method for analyzing DNA and RNA-binding proteins.**

chromatin immunoprecipitation sequencing (ChIP-Seq)

ChIP-Seq is used to determine where in the genome particular proteins, such as histones, are bound to the DNA. ChIP-Seq may also be used to determine whether other DNA-binding proteins bind within a genome. For example, it may be used to determine where particular regulatory transcription factors bind to specific genes. Note: In this example, micrococcal nuclease is used to separate nucleosomes. An alternative way to break up the DNA is to use shearing forces.

b) How Methylation can affect transcription?

First, methylation of CpG islands may prevent or enhance the binding of regulatory transcription factors to the promoter region. For example, methylated CG sequences could prevent the binding of an activator protein to an enhancer element, presumably by the methyl group protruding into the major groove of the DNA.

A second way that methylation inhibits transcription is via proteins known as methyl-CpG-binding proteins, which bind methylated sequences. These proteins contain a domain called the methyl-binding domain that specifically recognizes a methylated CG sequence. Once bound to the DNA, the methyl-CpG-binding protein recruits other proteins to the region that inhibit transcription. For example, methyl-CpG-binding proteins may recruit histone deacetylase to a methylated CpG island near a promoter. Histone deacetylation removes acetyl groups from the histone proteins, which makes it more difficult for nucleosomes to be removed from the DNA. In this way, deacetylation tends to inhibit transcription.

With My Best Wishes

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