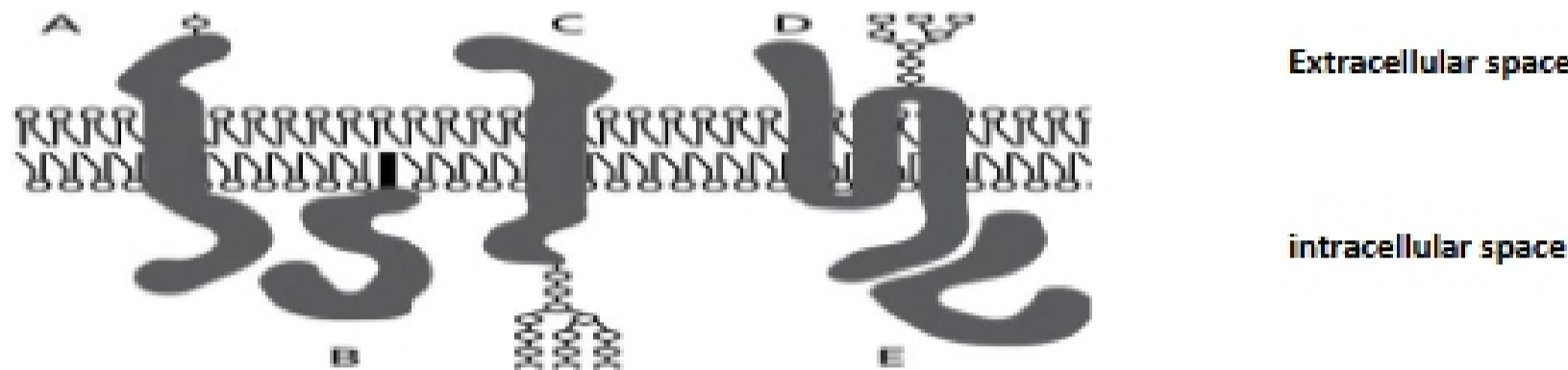


Part I. Multiple Choice. (1.5 pts each)

1. Which of the following is true about the mechanisms of genetic information flow in eukaryotic cells but NOT prokaryotic cells?
 - a. The direction of information flow is DNA->RNA->protein
 - b. Regulation occurs at both transcriptional and post-transcriptional stages
 - c. RNA splicing removes intron sequences from pre-mRNA
 - d. Protein translation starts by using a special initiator methionine-tRNA.

2. Which among the following arrangements in the figure below is LEAST likely to occur?



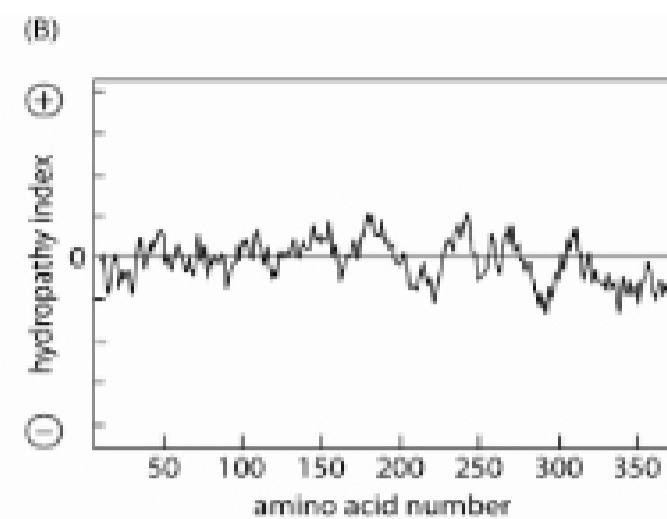
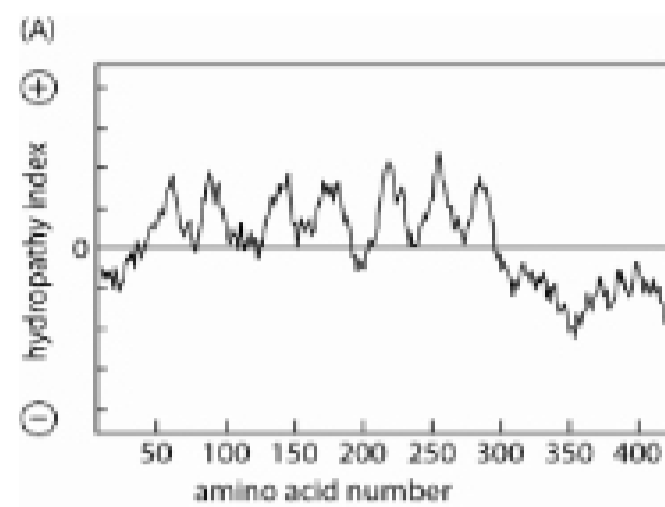
- a. A
 - b. B
 - c. C
 - d. D
 - e. E
3. Which of the proteins in the image above (question 2) would be extractable from a membrane with a high salt solution?
 - a. A, B, and C
 - b. B only
 - c. E only
 - d. C and D
 - e. B and E
 - f. All proteins depicted could be extractable with high salt solution.
 4. Which of the following accurately describes the acetylcholine receptor at neuromuscular junctions?
 - a. It is a voltage-gated cation channel
 - b. It is a P-type Ca^{2+} pump.
 - c. It is a mechanosensitive ion channel
 - d. It is a ligand-gated cation channel.
 5. Which of the following describes a function of the 7-methylguanosine cap?
 - a. Helps the cell to distinguish mRNA from rRNA
 - b. Prevents mRNA degradation in the cytosol
 - c. Serves as a ribosome binding site to initiate translation
 - d. All of the above.
 - e. None of the above.

BSCI330 Fall 2012 – Exam II KEY

6. Which of the following is true about eukaryotic RNA polymerase II?
- It requires general transcription factors to help position it on DNA during initiation
 - It is involved in the transcription of ribosomal RNA
 - It adds a poly-A tail to RNA after transcription is complete
 - All of the above.
 - None of the above.
7. Which of the following is a property of enhancers, but NOT promoters
- Contain binding sites for gene regulatory proteins
 - Are generally orientation-dependent
 - Are required for basal transcription
 - May be found upstream or downstream (or even inside) of the transcribed sequence
8. Which of the following must occur before a mature mRNA can be exported from the nucleus?
- The cap-binding complex must be removed
 - The exon-junction complexes must all be removed
 - The spliceosomes must all be removed
 - The poly-A-binding proteins must all be removed
 - The nuclear export receptor must be removed
9. Which of the following describes the effects of phosphorylating eukaryotic initiation factor 2 (eIF2)?
- Phosphorylation targets eIF2 for ubiquitylation and degradation via the proteasome
 - Phosphorylation of eIF2 converts it into an inhibitor of its own GEF, leading to a block in translation.
 - Phosphorylation by the MAP kinase pathway activates eIF2 to act as a transcriptional activator
 - Phosphorylation changes the conformation of eIF2, allowing it to translocate from the cytosol to the nucleus.
10. Calcium ion concentrations are kept _____ in the cytosol due to the actions of _____ in _____.
- High ; P-type pumps ; plasma membrane and ER
 - Low ; V-type pumps ; cytosol
 - High ; voltage-gated Ca^{2+} ion channels ; plasma membrane and ER
 - None of the above
11. Argonaute proteins are involved in the process of
- RNA splicing
 - RNA interference
 - RNA nuclear export
 - RNA poly-A tail addition

BSCI330 Fall 2012 – Exam II KEY

Examine the two hydropathy plots in the images below. Use these images to answer questions 10-11.



12. Which is a plot of a protein that contains amino acid segments that cross the membrane?

- a. Plot A
- b. Plot B

13. For the protein containing segments that cross the membrane, how many transmembrane domains does the hydropathy plot predict there are?

- a. 1
- b. 5
- c. 7
- d. 8 or 9

14. The K⁺ ion channel is able to selectively transport K⁺ but not Na⁺ ions due to the presence of _____ in the selectively loops that are wide enough to accommodate a K⁺ but not a Na⁺ ion.

- a. Four positively charged arginine amino acids
- b. Four carbonyl oxygen atoms
- c. Four polar asparagine amino acids
- d. All of the above.

15. Which step in protein translation requires energy from GTP hydrolysis?

- a. Linkage of amino acids to tRNA
- b. Binding of the ribosome to the mRNA
- c. Proofreading of the incoming tRNA anticodon-codon interaction
- d. Release of the completed protein at translation termination

16. Which of the following was NOT an essential component to the Langmuir Trough experiment carried out by Gorter and Grendell in 1925?

- a. The surface area of the red blood cells they used
- b. The total number of cells used
- c. The volume of lipid monolayer in the trough.
- d. The area of the lipid monolayer in the trough.