

## LS1101 End-Semester Examination

### PART A. Fill in the blanks with appropriate answers

(Total: 25)

1. Nucleotides in DNA are made of three basic components; ----- sugar, a -----group and four kinds of nitrogenous bases: -----, -----, ----- and -----.  
(3)
2. Myoglobin is made of 153 amino acids. The minimum number of nucleotides required to encode myoglobin would be -----.  
(2)
3. 100g of 4°C water is heated until it reaches 37°C. If the specific heat of water is 4.18 J/g°C, the amount of energy needed to cause this rise in temperature would be -----.  
(2)
4. A tripeptide has ----- number of amino acids and ----- number of peptide bonds. After disruption of all hydrogen bonds in a protein, ----- structure will be preserved.  
(2)
5. In each turn of the citric acid cycle, ----- molecules of CO<sub>2</sub> are released, ----- ATP is produced, ----- molecules of NAD<sup>+</sup> are reduced to ----- and -----FAD is converted to -----.  
(3)
6. Examples of polar amino acids would be -----, ----- and -----.  
(3)
7. R group interactions that contribute to tertiary structure of a protein include -----, -----, -----, and -----.  
(4)
8. Post translational modification usually occurs in ----- of the cell and one example of such modification would be -----.  
(2)
9. Skeletal and cardiac muscle cells are both ----- but only cardiac muscle cells have ----- for synchronized contraction.  
(2)
10. A patient was involved in an accident and lost large quantity of blood. To replenish the body fluids, distilled water is added to the blood directly via the veins. Due to this, the patient's red blood cells will ----- because the blood has become ----- compared to the cells.  
(2)

### PART B. Answer the following questions briefly

(Total: 32)

1. (a) An original section of DNA has the base sequence AGCGTTACCGT. A mutation in this DNA strand results in the base sequence AGGCGTTACCGT. What type of mutation does this change represent? How would this effect the protein sequence?  
(b) What would be the effect on the final protein product if a mutation caused the following change? Explain what type of mutation this is.  

5'-ATGAAGATTGCGCACTTA-3'

3'-TACTTCTAAACCGTGAAT-5'

to

5'-ATGTAGATTGCGCACTTA-3'

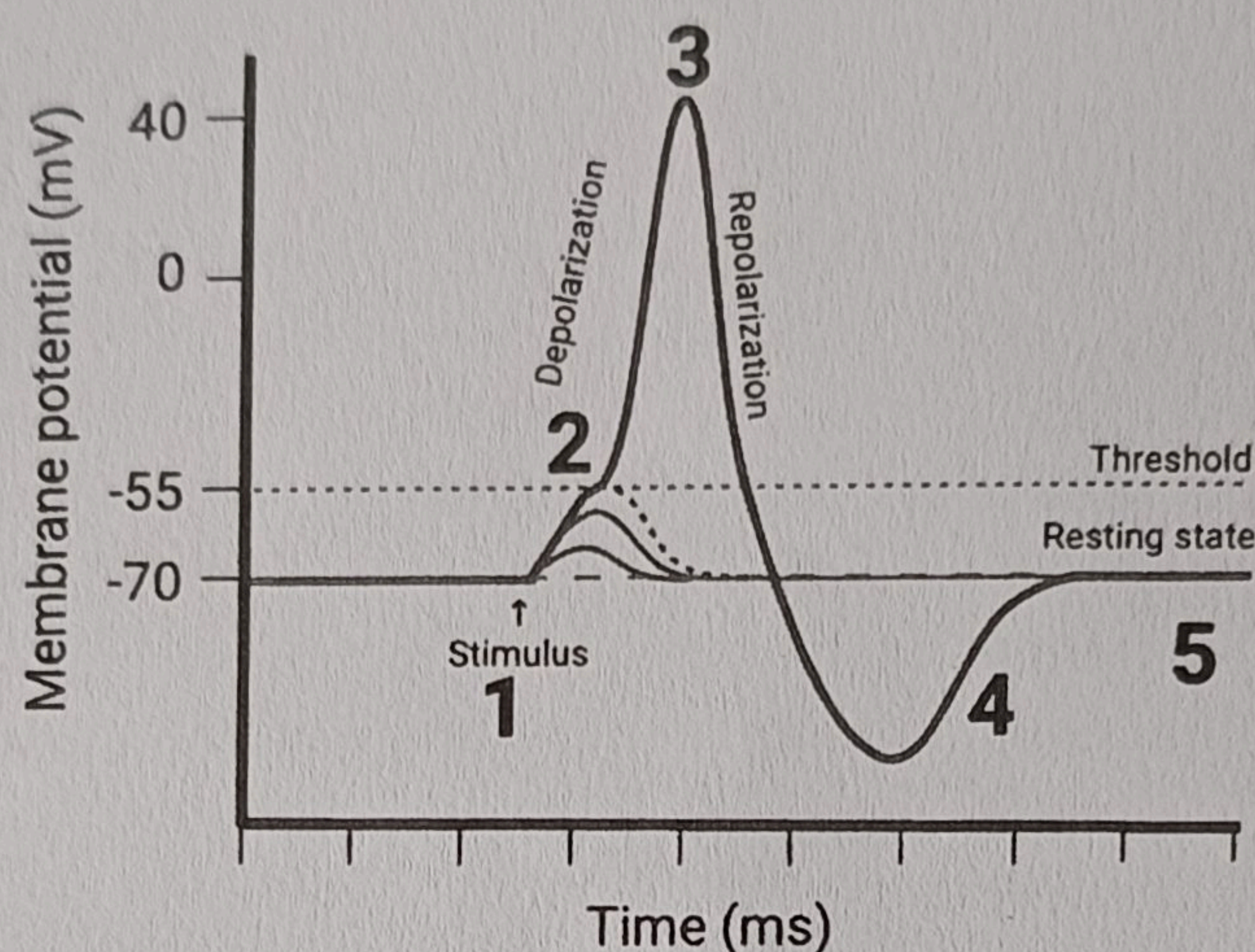
3'-TACATCTAAACCGTGAAT-5'

 (Just describe the change, there is no need to write the protein sequence.)  
 c) Is it possible predict the exact RNA sequence if you are given the protein sequence? Explain your answer.  
(5)
2. (a) What are the components of a triglyceride molecule and in which tissues are they found in high concentration? (b) What are the structural and functional differences between triacylglycerol and phospholipids? (structure not required). (c) Explain whether saturated or unsaturated fatty acids help to keep up membrane fluidity and why.  
(6)

153  
x 3  
-----  
459  
3  
-----  
462



3. The one gene one enzyme hypothesis has been updated based on modern discoveries. List three reasons why this hypothesis was updated. (3)
4. Explain the various steps in DNA replication describing the enzymes and their functions. (6)
5. Consider the following action potential diagram and explain briefly what happens at each stage shown. (5)



6. Match the chemicals in column 1 with their names/structural properties in column 2. (7)

Column 1	Column 2
1. Starch	8. D-Fructose
2. Cellulose	9. Polymer of glucose coiled into helical shape
3. Lignin	10. Polymer of glucose forming microfibrils
4. Chitin	11. Made of phenol derivatives as monomers
5. <chem>NC(CS)C(=O)O</chem>	12. D-Glucose
6. <chem>O=C1NC=CC(=O)N1</chem>	13. Adenine
7. <chem>O[C@H]1O[C@H](O[C@@H]2[C@@H](CO)[C@H](O)[C@@H]2O)[C@H](O)[C@@H](O)[C@H]1O</chem>	14. Uracil
	15. A polymer of N-acetylglucosamine
	16. Selenocysteine
	17. Cysteine