本試卷分選擇、配合及問答等三類試題，請分類依序於答案卷作答，並請標明題號!

一、選擇題 (共 3 題，每題 1 分)

_____ 1) CAM and C_4 plants conduct photosynthesis in ways that allow them to live in drier areas than most C_3 plants can tolerate. The effectiveness of different plants in restricting water loss while still allowing for influx of adequate CO_2 can be compared using the transpiration ratio, which is calculated by dividing the amount of water transpired by the amount of CO_2 fixed by photosynthesis. If a typical transpiration ratio for a C_3 plant is 500, then possible values for CAM and C_4 plants could be _____.

A) 750–1000
B) 500
C) 50–250

_____ 2) What is the function of proton pumps localized in the plant plasma membrane?

A) to facilitate diffusion of ions
B) to transfer phosphorus groups from ATP to proteins
C) to transfer metal ions across the plasma membrane
D) to transfer anions across the plasma membrane
E) to create a membrane potential

_____ 3) Compared to plants from other environments, the cells of many desert plants contain high concentrations of solutes. This helps them survive in their arid surroundings because the high solute concentrations create relatively _____, which help reduce water loss.

A) low solute potentials
B) high pressure potentials
C) low pressure potentials
D) high solute potentials

二、配合題 (請在表格中選出一個適合的答案填入下面空格中. 共 12 題，每題 1 分)

※ 注意：請於試卷內之「非選擇題作答區」依序作答，並應註明作答之部份及題號。

A. Shoot apical meristem	E. Perforation	I. Sieve plate	M. G-actin	Q: γ-tubulin
B. Vascular cambium	F. Amphipathic	J. Peroxisomes	N. F-actin	R: Vacuoles
C. Endodermis	G. Anterograde	K. α-tubulin	O. Retrotransposon	S: Heterochromatin
D. Pericycle	H. Retrograde	L. Euchromatin	P. Histone codes	

見背面

1. Casparian strip 所在的組織: _____
2. 參與 secondary growth: _____
3. 屬於 microbodies: _____
4. 屬於 transposon: _____
5. Phospholipids 的特性: _____
6. Microtubule 的組成單位(subunits): _____
7. Vessel element 特有的構造: _____
8. 屬於 apical meristem: _____
9. Histones modifications: _____
10. *cis*-Golgi 到 *trans*-Golgi 的運輸方向: _____
11. Microfilament 的組成單位(subunits): _____
12. Genome 上面轉錄活躍的區域: _____

三、問答題(共 9 題，各題配分如粗體字所標示)

1. Quorum sensing is the regulation of gene expression in response to fluctuations in cell-population density. Gram-positive and Gram-negative bacteria use quorum sensing communication circuits to regulate a diverse array of physiological activities. Please give an example of quorum sensing in bacteria. **(7分)**

2. The genomes of the influenza viruses are significantly plastic in that they change frequently due to antigenic drift and antigenic shift. These changes lead to the sudden appearance of new influenza viruses that cause pandemics. Please describe antigenic drift and antigenic shift that alter virus antigenicity. **(8分)**

3. Glucose concentration is tightly controlled by endocrine system, please briefly describe how does our body regulate the up and down of blood glucose level? **(8 分)**

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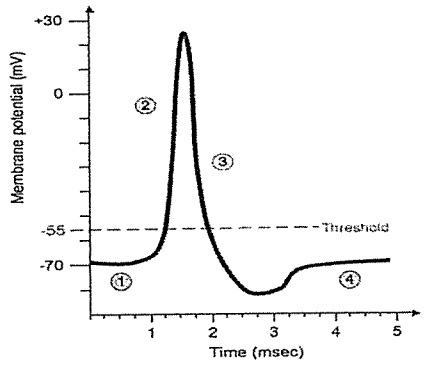
4. Action potential is the key feature for neuron to quickly transmit signal over the long distance. Please describe the action of ion channels and the flow of ions during different phases (numbered) of a typical action potential. **(3 points for each phase, 12 total)**



5. Plasticity of neural network is important for our ability to learn new content. The information summation is key step for neuronal plasticity. Please name and briefly describe two different summation methods neurons used for information computation. **(10 分)**

6. Please draw the pathways leading the catabolism of proteins, carbohydrates and fats from food to the oxidative phosphorylation. **(10 分)**

7. Cell communication can be done by direct, local and long distance signaling. Could you describe how these three types of signaling work and give a specific example for each. **(10 分)**

8. Cyclic adenosine monophosphate, abbreviated as cAMP, is an important second messenger that relays the signal from G protein-coupled receptors. (1) Please draw the chemical structure of cAMP, (2) Explain what is a second messenger, (3) What are the characteristic structures of a G protein-coupled receptor and G protein, respectively, (4) How G-protein activates the generation of cAMP, (5) How cAMP regulates cellular responses. **(每小題各 2 分，總共 10 分)**

9. Please draw a cell cycle indicating each stage and check points. Please also indicate the dynamic synthesis, degradation and assembly of cyclin and Cdk during cell cycle progression. **(10 分)**

試題隨卷繳回