請依照題號作答，所有答案請寫在試卷上。
Part I 的答案請依序填入**試卷上「選擇題作答區」**。

Part-I Single choice 45%

1. Which of the following statements about the cytoskeleton is incorrect?
(A) The dynamic aspect of cytoskeleton function is made possible by the assembly and disassembly of a few simple types of proteins into large aggregates.
(B) Microfilaments fix organelles in place.
(C) Movement of cillia and flagella is the result of motor proteins causing microtubules to move relative to each other.
(D) The cytoskeleton functions include structural support of the cell, motility and intracellular vesicle transportation.
(E) Microtubules, microfilaments and intermediate filaments are all cytoskeleton.

2. What is one of the ways that the membranes of winter wheat are able to remain fluid when it is extremely cold?
(A) by increasing the percentage of unsaturated phospholipids in the membrane
(B) by increasing the percentage of cholesterol molecules in the membrane
(C) by decreasing the number of hydrophobic proteins in the membrane
(D) A and B
(E) A, B and C

3. Of the following functions, which is most important for the glycoproteins and glycolipids of animal cell membranes?
(A) facilitated diffusion of molecules down their concentration gradients
(B) active transport of molecultes against their concentration gradients
(C) maintaining the integrity of a fluid mosaic membrane
(D) maintaining membrane fluidity at low temperatures
(E) a cell's ability to distinguish one type of neighboring cell from another

4. Which of the following is true of synaptic signaling and hormonal signaling?
(A) Hormonal signaling occurs in animals only.
(B) Hormonal signaling is important between cells that are at greater distances apart than in synaptic signaling.
(C) Both act on target cells by G-protein-signaling pathway.
(D) Only A and B are true
(E) A, B and C are true

5. Which of the following is not true of cell communication systems?
(A) Cell signaling was an early event in the evolution of life.

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(B) Communicating cells mau be far apart or close together.
(C) Most signal receptors are bound to the nuclear membrane
(D) Protein phosphorylation is a major mechanism of signal transduction.
(E) In response to a signal, the cell may alter activities by changes in cytosol activity or in transcription of RNA.

6. Which of the following is true concerning cancer cells?
(A) They do not exhibit density-dependent inhibition when growing in culture.
(B) When they stop dividing, they do so at random points in the cell cycle.
(C) They are not subject to cell cycle control.
(D) B and C only.
(E) A,B,C

7. The major check point of cell cycle is at which stage?
(A) G0
(B) G1
(C) S
(D) G2
(E) M

8. How does the sexual life cycle increase the genetic variation in a species?
(A) by allowing independent assortment of chromosomes
(B) by allowing random fertilization
(C) by allowing crossing over
(D) A and B only
(E) A, B and C

9. The leading and the lagging strands differ in that
(A) the leading strand is synthesized in the same direction as the movement of the replication fork, and the lagging strand is synthesized in the opposite direction.
(B) The leading strand is synthesized by adding nucleotides to the 3' end of the growing strand, and the lagging strand is synthesized by adding nucleotides to the 5' end.
(C) The leading strands is synthesized continuously, whereas the lagging strand is synthesized in short fragments that are ultimately stitched together.
(D) Both A and B.
(E) Both A and C.

10. Which of the following is not true of RNA processing?
(A) Exons are cut out before mRNA leaves the nucleus.
(B) Nucleotides may be added at both ends of the RNA

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(C) Ribozymes may function in RNA splicing.
(D) RNA splicing in thought to be catalyzed by spliceosomes.
(E) A primary transcript is often much longer than the final RNA molecule that leaves the nucleus.

11. The lactose operon is likely to be transcribed when
(A) there is more glucose in the cell than lactose
(B) the cyclic AMP leavels are low.
(C) There is lactose but no glucose in the cell.
(D) The cylclic AMP and lactose levels are both high within the cell.
(E) Both C and D.

12. Given a population that contains genetic variation, what is the correct sequence of the following events, under the influence of natural selection?
1. Differential reproduction occurs
2. A new selective pressure arises.
3. Allele frequencies within the population change.
4. Poorly adapted individuals have decreased survivorship.

(A) 2,4,1,3
(B) 4,2,1,3
(C) 4,1,2,3
(D) 4,2,3,1
(E) 2,4,3,1

13. All of the following are criteria for maintaining Hardy-Weinberg equilibrium involving two alleles except
(A) the frequency of all genotypes must be equal
(B) there should be no natural selection
(C) matings must be random
(D) populations must be large
(E) gene flow from other populations must be zero

14. Some species of mosquito live in brackish water, some in running fresh water, and others in stagnant water. What type of reproductive barrier is obviously separating these different species?
(A) habitat isolation
(B) temporal isolation
(C) gametic isolation
(D) behavioral isolation
(E) postzygotic isolation

15. Which of the following are important biotic factors that can affect the structure and organization of biological communities?

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(A) precipitation, wind
(B) nutrient availability, soil pH
(C) predation, competition
(D) temperature, water
(E) light intensity, seasonality

Part-II. True or False (30%) ※ 注意：請於試卷上「非選擇題作答區」標明題號依序作答。

1. The unit of evolution is "population" instead of "individual".
2. Natural selection can directly act on genotype.
3. Speciation can only take place with geographic separation.
4. Phylogenetic systematics informs the construction of phylogenetic trees based on shared characters.
5. Ecological nich is the total sum of a species' use of the biotic and abiotic resources in its environment.
6. The development of a fertilized egg will be influenced by the cytoplasm of the egg.
7. The formation of an organ depends on cell division and differentiation, but not on apoptosis.
8. Gene regulation can be regulated at any stage, but the key step is transcription.
9. The osmoregulation in a saltwater fish includes the excretion of salt ions by gills and excretion of water by kidneys.
10. For a resting neuron, the membrane potential is more negative than the threshold potential.

Part- III Answer the questions (25%) ※ 注意：請於試卷上「非選擇題作答區」標明題號依序作答。

1. How animals keep homeostasis of body temperature? (5)

2. Using bird as an example to explain "structures fit functions". (5)

3. Compare the innate and acquired immunity. (10)

4. How kangaroo rat adapts desert environment. (5)

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