**Choose the CORRECT answer to each question (Questions 1-40). Two points for each question.**

1. Which of the following occurs when a stimulus depolarizes the membrane of a neuron? (a) Both the sodium and potassium channels open; (b) The membrane potential rises from the resting potential to a potential closer to the threshold potential; (c) The membrane potential reaches the undershoot level; (d) potassium ions flow into the neuron; (e) All of the above.
2. Of the following, the item that is NOT grouped properly with the other items is: (a) primary stem cell; (b) T lineage precursors; (c) B-cell; (d) Helper/induce T-cell; (e) cytotoxic/suppressor T-cell.
3. Which of the following is NOT a product of the Krebs cycle? (a) carbon dioxide; (b) ATP; (c) NADH; (d) acetyl CoA; (e) the reduced form of flavin adenine dinucleotide.
4. The most primitive system of obtaining energy by living organisms is (a) the cytochrome system; (b) Krebs Cycle; (c) aerobic respiration; (d) photosynthesis; (e) fermentation.
5. Which of the following is NOT related to the contraction of the vertebrate skeletal muscle? (a) intercalated disc; (b) sarcoplasmic reticulum; (c) Tropomyosin; (d) Actin; (e) calcium ions.
6. Which of the following does NOT involve in the glucose homeostasis? (a) Glucocorticoids; (b) Pancreas; (c) Liver; (d) Glucagons; (e) Islets of Langerhans.
7. Which of the following is NOT true for lysosome? (a) It is a membrane-enclosed bag of enzymes; (b) The enclosed enzymes can be used to digest macromolecules; (c) Its enzymes work best under an acidic condition; (d) It is found in the nucleus.
8. For cytochromes to function normally in cellular respiration, which of the following mineral is essential? (a) Calcium; (b) Iron; (c) Phosphorus; (d) Magnesium; (e) Iodine.
9. How many kinds of amino acids can be found in proteins? (a) 10; (b) 20; (c) 30; (d) 40; (e) 50.
10. Bile salts are required for (a) carbohydrate digestion; (b) fermentation; (c) protein digestion; (d) fat emulsification; (e) peristalsis.
11. The inactive protein-digesting zymogens of trypsin, chymotrypsin, and carboxypeptidase from the pancreas are activated by one of the following enzymes: (a) Enterokinase; (b) Carboxypeptidase; (c) Lipase; (d) Chymotrypsin; (e) Lactase.
12. According to an article by R.K.J. and P.F.C. published in the December 2001 issue of the Scientific American, Therapeutic angiogenesis can involve direct

administering a blood vessel growth-promoting substance, such as vascular endothelial growth factor, to promote blood vessel growth. Which of the following results can possibly seen in the clinical trials about this medical strategy: (a) It is effective to diabetic patients suffering vascular disorders in their feet and legs; (b) It is effective to heart attack patients; (c) It is effective to patients suffering from ischemia (a blood clot forms in one of the arteries that feeds the heart muscle); (d) Potential risks could increase a patient's of cancer; (e) All of the above.

13. A person with one of the blood types is said to be a universal recipient of blood. (a) type A; (b) type B; (c) type O; (d) type AB.
14. Which of the following is derivatives of the mesoderm? (a) Thyroid; (b) Skeletal and cardiac muscle; (c) Tooth enamel; (d) Cornea; (e) All nervous tissue.
15 Which of the following blood vessel drains the blood from the small intestine directly into the liver? (a) Posterior cardinal vein; (b) Hepatic portal vein; (c) Ventral aorta; (d) Carotid artery; (e) Intestinal vein.
16. A bilayer of phospholipids are found in (a) Golgi apparatus; (b) chromatin; (c) the plasma membrane; (d) vacuole; (e) microtubules.
17. Bounded ribosomes are attached to (a) rough endoplasmic reticulum; (b) smooth endoplasmic reticulum; (c) nucleus membrane; (d) cell membrane; (e) cytosol.
18 Which of the following structures does NOT belong to angiosperms? (a) Flagellated sperm; (b) Sporophyte; (c) Flower; (d) Stigma; (e) Anther.
19. Which of the following is TRUE for rhodophyes? (a) The presence of phycoerythrin; (b) Reddish coloration; (c) the presence of thalli; (d) The absence of flagellated stages in the life cycle; (e) All of the above.
20. All of the following statements are related to the dark reaction of photosynthesis. All of them are true EXCEPT (a) Carbon dioxide combines with ribulose biphosphate and form PGAL; (b) Calvin cycle is involved; (c) Photolysis of water takes place; (d) Glucose is a product; (e) Photorespiration takes place.
21. Which of the following is NOT a characteristics of plasmid? (a) A fragmentary particle in a eukaryotic cell; (b) A circular DNA molecular separate from the bacterial chromosome; (c) It is broadly used in genetic engineering; (d) Certain plasmids can undergo a reversible incorparation into the cell's chromosome forming the episome; (e) Plasmid has very few genes.
22. During transcription, which of the following is NOT required? (a) RNA Polymerase; (b) Promoter; (c) Transcription factors; (d) tRNA; (e) Template strand of DNA.
23. In the gene pool of a given population of guppy, 70% of the gametes carry the dominant allele for bright coloration. What percentage of the population under

equilibrium condition is heterozygous bright in their coloration? (a) 20%; (b) 32%; (c)42%; (d)64%; (e) 90%.

24. During which of the following geological period that major extinction wiped out more than half of all species, including all dinosaurs? (a) Cambrian; (b) Devonian; (c) Cretaceous; (d) Permian; (e) Jurassic.
25. Laurasia was a land mass in the Mesozoic that included the continents presently called (a) North America+Eurasia; (b) Africa+South America; (c) Australia +Africa; (d) Eurasia+Africa; (e) None of the above.
26. Corn (*Zea mays*) has some alleles that can be traced to a closely related wild grass called teosinte (*Zea mexicana*) is a case of (a) hybrid inviability; (b) introgression; (c) imbreeding; (d) hybrid swarm; (e) genetic drift.
27. In human beings, brown eyes are usually dominant over blue eyes. Assume that a blue-eyed man married a brown-eyed girl whose father was blue-eyed, the percentage of their children with blue eyes would be closest to (a) 10%; (b) 35 %; (c) 50%; (d) 80%; (e) 95%.
28. Which of the following is INCORRECTLY paired with its characteristics? (a) Ctenophora—comblike plates of fused cilia, a pair of long, retractable tentacles for food capturing; (b)Nematoda—cylindrical pseudocoelomate worms, may parasitize other animals; (c) Annelida—body not segmented, some are aquatic; (d) Echinodermata—all marine, the internal and external parts of the animal radiate from the center of the body; (e) Agnatha—jawless animals, with less than three pairs of semicircular canals.
29. In the case of comparing fishes to other vertebrates, having vertebrae is (a) an apomorphic character; (b) a plesiomorphic character; (c) an autapomorphic character; (d) a character useful for distinguishing fishes; (e) an example of analogy.
30. Exponential population growth is NOT related to (a) carrying capacity; (b) ideal environmental condition; (c) unlimited resource; (d) unlimited population increment; (e) maximum population growth rate.
31. . Which of the following animals is likely to be r-selected? (a) Paramecium; (b) Rat; (c) Dolphin; (d) Bat; (e) Human.
32. In the nitrogen cycle, the bacteria that turn ammonia into nitrates are (a) denitrifying bacteria; (b) nitrifying bacteria; (c) Rhizobium bacteria of root nodules; (d) nitrogen fixing bacteria; (e) ammonifying bacteria.
33. Which of the following item is NOT related to the other items? (a) Batesian mimicry; (b) Aposematic coloration; (c) Deceptive coloration; (d) Mullerian mimicry; (e) Chemical weapons.
34. One of the following issues has nothing to do with the determinates of

community characteristics: (a) Niche differences and resource partitioning among sympatric species; (b) The absence of predators; (c) Homogeneity of environmental patchiness; (d) High species richness; (e) The presence of a key-stone predator.

35. In the mating systems of animal kingdom, a polyandrous relationship often involves (a) a single male mates with many females; (b) a stable pairing of a male and a female; (c) a single female mates with several males; (d) random mating among several males and several females; (e) none of the above.
36. Pecking order among social animals is a type of (a) mating relationship; (b) dominance hierarchy; (c) territorial relationship; (d) parental/offspring relationship; (e) random social relationship.
37. Which of the following elements does not belong to the oceanic pelagic biome? (a) Photic region; (b) jellyfishes; (c) nekton; (d) benthos; (e) albratrosses.
38. Learning that takes place during a critical period of an animal's life time is specifically called (a) conditioning; (b) imprinting; (c) insight; (d) habituation; (e) play.
39. Endosymbiotic model concerns with (a) the eukaryotic origin ; (b) the prokaryotic origin; (c) origin of the bacteria; (d) None of the above.
40. Ancient earth was NOT characterized by (a) fermentation; (b) anaerobic respiration; (c) glycolysis being the only metabolic pathway; (d) the domination of the Kingdom Monera; (e) All of the above.

**Fill-in questions (Questions 41-50). Two points for each question. PLEASE ANSWER IN ENGLISH.** (答案請填寫於答案卷內)

41. Symbiosis encompasses several types of interspecific interactions. _____ and _____are two of these interactions.
42. In human autonomic nervous system, the heart is innervated by the _____ and _____ nerves that often having anatagonistic effects.
43. _____- and _____- are two of the three kinds of hormones from the intestinal wall required for regulation of digestion.
44. Each of a human cell contains a collection of genes that number approximately _____.
45. A vertebrate possessing an amnion surrounding the embryo is called _____.
46. A group of nuclei in the lower part of the mammalian forebrain that determine emotion is called _____.
47. The plant hormone that stimulates stem elongation, root growth, differentiation,

development of fruit, etc. is _____, and the one that inhibits growth is _____.

48. An animal that does not actively adjust its internal osmolarity because it is isosmotic with its environment is called_____.

49. The building block of a nucleic acid, consisting of a five-carbon sugar covalently bonded to a nitrogenous base and a phosphate group is called_____.

50. Throughout the chloroplast, thylakoid sacs are stacked to form structures called _____.

# 國立中山大學九十一學年度碩士班招生考試試題

科目：動物生理學（海生所）（選考）

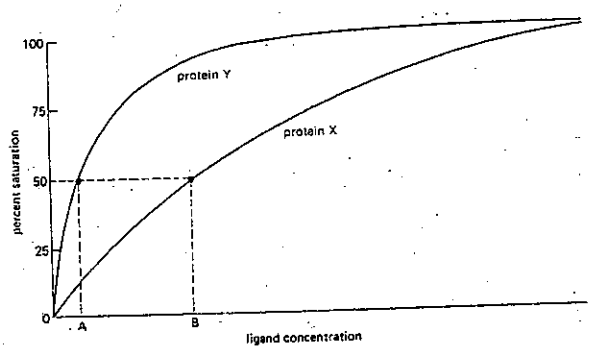


(A) 解釋名詞(每題 3 分)

1. active immunity
2. adolescence
3. biological clock
4. antagonist
5. chyme
6. glucose sparing
7. H-Y antigen
8. micelle
9. promoter
10. transverse tubule

(B) 問答題(每題 7 分)

1.




Explain the above differences in binding affinity.

2. List the major subdivisions of the central nervous system.
3. Describe the importance of the initial segment of the neuron to the integrator function of the cell body.
4. Describe the difference between long-loop and short-loop negative feedback.
5. Describe the propagation of the muscle action potential in muscle cell.
6. List the factors that determine pulse pressure.
7. Describe why increased $H^+$ concentration in an exercising muscle is beneficial.
8. What are the two most important factors controlling potassium plasma concentration?
9. What are the luminal stimuli capable of initiating gastrointestinal reflexes?
10. Describe the roles of interferon in defense against cancer cells and viruses.

# 國立中山大學九十一學年度碩士班招生考試試題

科目：普通植物學(海生所)(選考)



問答題:

1.畫出植物細胞構造 (25%)

2.解釋並圖示光合作用電子傳遞鏈 (25%)

3.列出植物所需之無機營養鹽並以一種無機營養鹽說明植物如何面對無機營養鹽缺乏之逆境 (25%)

4.列出植物荷爾蒙及其可能之作用 (25%)

# 國立中山大學九十一學年度碩士班招生考試試題

科目：海洋生物所　生態學（選考）



I. 單選題 (30%)

1. Most of observed evolution has probably resulted from (a) directional selection (b) stabilizing selection (c) disruptive selection (d) no selection (e) special selection.
2. Evolution occurs (a) at a constant rate (b) over physiological time (c) at the same rate in different species groups (d) continuously
3. Which one is true in the characteristics of photosynthesis in the C4 and CAM (crassulacean acid metabolism) plants ? (a) low water loss in C4 (b) low photosynthetic rate in C4 (c) PEP and RuDP carboxylases both used in C4 and CAM types (d) high optimum day temperature for growth in C4 (e) all of the above.
4. Which one of the following method is an estimation of an absolute population density ? (a) questionnaires (b) capture-recapture method (c) catch per unit fishing effort (d) feeding capacity (e) number of fecal pellets.
5. Population change is driven by (a) mortality (b) natality (c) immigration (d) emigration (e) all of the above.
6. Which one of the followings is a plant secondary metabolite ? (a) lignin (b) protein (c) alkaloids (d) acetate (e) fat.
7. Communities in tropical and subtropical areas with a moderate winter dry season are (a) monsoon forest (b) tropical rain forest (c) tundra (d) needle-leaved forest (e) savanna.
8. Which system has the highest percentage of net primary production going to animal consumption ? (a) tropical rain forest (b) temperate deciduous forest (c) grassland (d) tropical desert (e) oceanic upwelling zones.
9. Biodiversity is influenced by ? (a) history (b) disturbance (c) predation (d) climatic variability (e) all of the above.
10. Which of the following is a community characteristic (a)age (b)competition (c)trophic structure(d)longevity (e)sex

II. 解釋名詞 (30%)

1. Phenotype
2. C3 plants
3. Life cycle vs. life span
4. Maximum sustained yield
5. Primary succession vs. secondary succession
6. Dispersal
7. Life table
8. Coevolution
9. Vertical migration
10. Keystone species

III. 簡答題 (40%)

1. Describe all the possible reasons for the wild spread of the exotic species "蔓澤蘭" in Taiwan ?
2. Discuss the implications of the relationship between distribution and abundance for conservation biology.
3. For r-selected pests, optimal control can be achieved by reducing reproduction rather than by increasing mortality. Discuss the ecological reasons behind this recommendation.
4. Why are arctic ecosystems particularly susceptible to the impacts of climatic warming ?

# 國立中山大學九十一學年度碩士班招生考試試題

科目：水產生物學（海洋生物研究所適考）



A. 解釋名詞 (30%)

a. r- and K-selection
b. 栽培漁業 (Sea ranching)
c. Migration
d. Upwelling
e. Food conversion rate
f. Recruitment

B. 填充題 (32%)

1. 台灣比較常見的箱網養殖魚類包括 a._____; b._____; 和c._____。
2. 近海漁業捕獲的水產生物種類及主要使用漁具包括: d._____ 使用漁具是 e._____; f._____ 使用漁具是 g._____ 和 h._____ 使用漁具是 i._____。
3. 遠洋漁業主要的漁具漁法包括：j._____; k._____ 和 l._____ 等。
4. 在水產資源管理理論中影響魚群生物量的主要變數包括 m._____, n._____, o._____ 和p._____。

C. 問答題 (38%)

1. 請就你所知說明台灣草蝦病變的主要原因和解決的方法。(14%)
2. 請就你所知列出有關水產生物的中文及外文教科書(或參考書) 各至少兩冊以上的作者，書名和出版社。(12%)
3. 請寫出本托蘭斐(Bertalanffy) 成長方程式，並且說明式中各參數或變數分別代表甚麼意義。 (12%)