國立中山大學九十學年度碩博士班招生考試試題

科目：普通生物學【海生所碩士班】

Fill-in questions (Questions 1 to 15). Two points for each question. PLEASE ANSWER IN ENGLISH OR CHINESE.

答案請由答紙上第二頁開始，每題須註明題號.

1. Nucleotides consist of three structural components, namely,-------, -------, and -------.
2. Redox reactions involve transfer of ------- from one reactant to another.
3. The taxonomic or scientific name of human being is-------.
4. The sex chromosomes for male and female fruitflies are---- and ----, respectively.
5. In animals nitrogenous wastes are disposed in one of the three different forms:-------, --------, and-------.
6. A countercurrent-flow system is found in the----------(an organ) of a fish.
7. The genotypes for human blood type AB and type O are--------- and--------, respectively.
8. Given that the sequence of the nitrogenous bases in the template DNA strand be TGCAC, the sequence of the nitrogenous bases in the new DNA strand is:----------.
9. Two or several unpalatable species with aposematic coloration resemble each other in their color patterns to discourage predators. Such phenomenon is called------ mimicry.
10. The logistic population growth equation is:----------, whereas the equation for exponential population growth is:----------.
11. The protostomes are characterized by (1) the ------- being directly developed from the blastopore and (2) ------ cleavage of the fertilized eggs.
12. The autonomic nervous system is consists of two divisions, each having oppositive effects to the organs they innervate. These divisions are the------- and-------- nervous systems.
13. In the nitrogen cycle,---------- and --------- are the two biochemical processes responsible for nitrogen flow between the food chain and the environment.
14. Vitamin--------is water-soluble and vitamin ----- is fat-soluble.
15. A drop in pH shifts the oxygen dissociation curve for hemoglobin toward the right if call the ------- shift.

Choose one most appropriate answer to each question (Questions 16-50). Two points for each question. 答案請寫在答案紙第一頁，依題號填入(16)至(50)

16. What color of the cell walls in Gram-positive bacteria will turn to after treatment of Gram stain ? (a) red. (b) violet. (c) yellow. (d) green. (e) pink.

17. Flyingfishes and needlefishes belong to the Exocoetoidei, then they must also belong to the same (a) species. (b) family. (c) order. (d) tribe. (e) genus.

18. Massive extinction of dinosaurs took place in the period (a) Jurassic. (b) Permian. (c) Devonian. (d) Cretaceous. (e) Tertiary.

19. Reptilia is a (a) natural taxonomic group. (b) monophyletic group. (c) paraphyletic group. (d) polyphyletic group.

20. Which of the following is closely related to macroevolution? (a) genetic drift. (b) Hardy-Weinberg equilibrium. (c) extinction rate. (d) non-random mating. (e) gene flow.

21. If relative fitness of the carriers of a genotype averages only 60 % as many offsprings as that of the best fit genotype, then what is the selection coefficient ? (a) 0.1. (b) 0.2. (c) 0.4. (d) 0.8. (e) 1.0.

22. A particular disease is caused by a recessive allele and it occurs in 4 over 10000 persons. Under Hardy-Weinberg equilibrium, what is the proportion of carriers of this disease in the population who do not show the symptom of such disease (heterozygotic genotype)? (a) 1 %. (b) 2 %. (c) 4 %. (d) 6 %. (e) 10 %.

23. Which of the following is required for the beginning of transcription of the DNA ? (a) RNA polymerase. (b) exon. (c) termination site on the DNA. (d) intron.

24. In the kidney, reabsorption of large molecules, such as glucose, takes place at the (a) Bowman's capsule. (b) proximal convoluted tubule on the cortex. (c) descending limb of Loop of Henle. (d) ascending limb of Loop of Henle, (e) collecting duct.

25. Compare to isotope carbon-12, the isotope carbon-14 has (a) a different number of proton. (b) two more electrons. (c) two more neutrons. (d) a different charge. (e) accounted for a higher percentage of carbon in nature.

26. Which of the following statements about saturated fats is correct? (a) they are more common in plants than in animals. (b) they form solids at room temperature. (c) they have one or more double bonds between the carbon atoms of their fatty acids, (d) they have fewer hydrogen atoms than do unsaturated fats with the same number of carbon atoms.

27. Pacemaker in human heart is located in the wall of the (a) left atrium, (b) right atrium. (c) Bundle of His. (d) Left ventricle. (e) right ventricle.

28. Which of the following pairs of biological terms is mis-matched ? (a)myosin-Rectus abdominia. (b) brain-asymmetric. (c) angiosperm-monocot. (d) Parenchyma cell-chloroplasts. (e) Basilar membrane-photoreceptors.

29. In a mark-recapture survey of a deepsea isopod population, isopods were captured. 5000 individuals were marked and released at the collecting site. Later

10000 individuals were caught in which 500 were marked recaptures. What is the estemated number of individuals in that isopod population ? (a) 10000. (b) 50000. (c) 100000. (d) 200000.

30. Type I survivorship curve would be expected in a species in which (a) a high number of offspring is produced. (b) little parental care is provided to the offsprings.(c) death rates increase among elderly groups. (d) number of survivors decrease linearly with age.

31. According to the theory of Island Biogeography, which of the following factors has THE LEAST effect on the equilibrium number of species in an island? (a) immigration and extinction rates. (b) island size. (c) distance from mainland. (d) size of the mainland population. (e) niche availability on the island.

32. A r-selected species of water flea has the following characteristics EXCEPT (a) population growth rate close to intrinsic rate of increase. (b) short generation times. (c) great reproductive potential. (d) significant population fluctuation. (e) inhabiting a moderately constant environment.

33. The specificity of adaptation for both respiration and flight for birds is (a) a specialized lung. (b) a low-density skeletal system. (c) a system of air sac interconnect with the lungs. (d) high level of fat. (e) a specialized pair of wings

34. The function of plant hormone Ethylene is for (a) balancing growth of main root and shoot. (b) inducing ripening in mature fruits. (c) controlling differentiation. (d) controlling direction of root growth. (e) reducing water loss.

35. Before the first leave begins to carry on photosynthesis, energy needed for the growing of a plant embryo comes from (a) coleoptile. (b) root tip. (c) cotyledon. (d) cambium.

36. Plants measure the duration of darkness in a photoperiod by the differentiation between the two structures of (a) Phytochrome. (b) Cytokinins.(c) Abscisic acid. (d) Auxins. (e) Gibberellins.

37. Which of the following is NOT true for the sodium-potassium pump across the animal cell membrane? (a) This pump exchanges potassium ions for sodium ions across the membrane. (b) Energy is needed to carry out this exchange. (c). Phosphorylation occurs during ion exchange. (d) Conformational change in the pump takes place during ion exchange.

38. In which of the following stages of mitosis that all the chromosomes are alined on the plane equidistance from the two poles of the cell. (a) interphase. (b) prophase. (c) metaphase. (d) anaphase. (e) telophase.

39. Which of the following enzymes helps unwind the parental double helix during synthesis of new DNA strands? (a) DNA ligase. (b) Helicase. (c). primase. (d) DNA polymerase.

40. The light reactions of photosynthesis supply the Calvin cycle with (a) organic acids. (b) carbon dioxide. (c) water. (d) starch. (e) Glyceraldehyde phosphate.

41. Which of the following pathways is shared by both aerobic respiration and fermentation? (a) electron transport chain. (b) Kreb cycle. (c) Glycolysis. (d) Calvin cycle.

42. Which of the following component is present in prokaryotic cells. (a) mitochondria. (b) ribosomes. (c) nuclear envelope. (d) chloroplasts. (e) Golgi apparatus.

43. In a Lytic cycle occurred after a virus had invaded a bacterium, which of the following does NOT take place inside the bacterium? (a) viral DNA replication. (b) viral DNA transcription. (c) translation. (d) viral DNA integrates into the bacterial chromosome.

44. Mesoderm gives rise to the following derivatives EXCEPT (a) muscle. (b) bone. (c) tooth enamel. (d) organs of urogenital system. (e) lymphoid tissues.

45. Which of the following statements about the propagation of change in action potential along a nerve cell is INCORRECT ? (a) During the resting stage of the neuron, the inside of the neuron is negative in charge with respect to the outside, i.e., relatively rich in potassium ions and low in sodium ions inside the neuron. (b) During depolarization at the site under stimulation (Site 1), sodium channels open allowing sodium ions to rush into the neuron. (c) During repolarization, sodium channels close and potassium channels open. (d) Under the effect of influx of sodium at Site 1, extracellular sodium ions at Site 2, a site next to Site 1, diffuse toward Site 1 causing depolarization at Site 2. (e) Sodium channel remains open for several msec until a commanding electrical signal for closure of the channel arrives

46. Gametophytes and sporophytes of *Ulva* differ in their (a) size. (b) habitat. (c) macroscopic morphology. (d) chromosome number.

47. Which of the following function (or action) is INCORRECTLY paired with the hormone ? (a) Lowers blood sugar—insulin. (b) Increases heart rate—norepinephrine. (c) Supports spermatogenesis—testosterone. (d) Promotes continued growth of uterine lining—progesterone. (e) Lowers blood calcium—mineralocorticoid.

48. A type of learning only takes place at a critical period during the lifetime of some animals. (a) habituation. (b) trial and error. (c) conditional reflex. (d) insight learning. (e) imprinting.

49. Receptor sites for neurotransmitters are located on the (a) presynaptic membrane. (b) postsynaptic membrane. (c) synaptic cleft. (d) axon of

transmitting neuron. (e) synaptic vesicles.

50. Which of the following is NOT considered to be a tissue? (a) heart. (b) blood. (c) skeletal muscle. (d) cartilage. (e) skin.

國立中山大學九十學年度碩博士班招生考試試題

科目：水產生物學【海生所碩士班】選考

請清楚註明題號在答案纸上

水產生物學

A. 解釋名詞 (共 30 分,每小題六分)

a. **Fishing effort**
b. **Sport fishery**
c. **Length at sexual maturity**
d. **By-catch**
e. **Cod-end**

B. 是非題 (請按照題號順序,以"+" 或"T"表示"是", 以"--"或"F"表示"非") (20 分)

(每小題二分,答錯倒扣一分)

a. 虱目魚是一種廣溫性和狹鹽性的魚類。
b. 鮭魚和鰻魚進行溯河迴游都是爲了產卵的需要。
c. 魚探計進行探魚時是使用低頻度的音波,因此人耳可以聽到發出的聲音。
d. 一般上軟體動物(貝類)比其它水產生物更容易受到環境污染的影響。
e. 熱帶海域的魚類由於生長快速,其年齡形質比較容易辨認 。
f. 浮游性魚種通常產卵量很大,是爲了適應海底中比較低溫的環境。
g. 小魚進入了親魚的生活棲所時的就被稱爲進入了補充群。
h. 單位努力漁獲量(CPUE)愈大表示魚群密度愈高。
i. 水產生物產量由低至高的順序爲:外洋,河口,大陸棚,湧昇流區。
j. 由於海表面環境多變，洄游性魚類通常具有多變之體型。

C. 問答題

a. 請從漁業生態的立場說明浮游性魚類與底棲性魚類的主要差別有那些。(15 分)
b. 鯊魚是海洋中的霸主，是否仍然需要保護? 爲甚麼? (10 分)
c. 海洋中大部份的水產生物資源都分布在 200 海浬以淺的海域，請以條列的方式說明其原因。 (15 分)
d. 請問魚類年齡查定可以提供我們有關魚群的那些資訊? (10 分)

國立中山大學九十學年度碩博士班招生考試試題

科目：生態學【海生所碩士班】選考

<<請依序將各題題號清楚寫在答案卷

I. Multiple choices: (4 points for each correct answer) 選擇題答案寫在專用頁上

1. Amensalism is the relationship between two species in which a) no dependence existed between the two b) one is beneficial but has no effect on another member c) both members are beneficial d) one is inhibited or harmed by another member.

2. Species diversity is a numerical measure combing a) the number of species in an area with their relative abundance b) the number of top predators with their trophic superiority c) species richness and species composition d) the number of species in an area with their respective percentile ranking.

3. The term 'oligotrophic' is most likely to happen in a) an upwelling b) a river plume c)the Kuroshio d)intensive fish farming.

4. Microzooplankton are organisms not associated with a) ciliates b) flagellates c) plankton larger than 200 μm d) the microbial loop.

5. Zooxanthellae are a) parasites found in zoo animals b) symbiotic dinoflagellates c) pigments added to enhance food coloring d) organisms that live wholly on the surface of plants.

6. Autotrophs are organisms that a) are primary producers in an ecosystem b) are herbivorous c) automatically reproduce to compensate for energy loss during trophic transfer d) predate at the top of an ecosystem .

7. Fecundity refers to a) number of eggs carried by a female b) number of individuals a given area can support c) the amount of oxygen a whale can take in d) the maximum weight one animal can move.

8. r-selection is selection a) under carrying capacity conditions b) beyond carrying capacity conditions c) under low population density d) under high population density.

9. Clone is a group of a) morphologically similar organisms b) genetically identical individuals c) individuals from the same parents d) organisms that are produced sexually from siblings.

10. Disturbance theory explains a) the impact of water turbulence on ecosystem b) perturbation to an ecosystem by anthropogenic activity c) wind chilling effects on water surface d) high diversity in deep sea.

II. Answer the following questions. Give 3 key words for each of your answers and list the key words at the beginning of each answer (30% of the assigned points).

11. What is the significance to study ecological events in the viewpoint of global change? (20 points)

12. What kinds of ecological events will be observed after a severe forest fire? Are forest fires detrimental (harmful) to the ecology of a forest? Why? Will this series of ecological events be different from that of an estuary following a massive flood? (20 points)

13. What are the extrinsic factors that regulate the size (number of individuals) of a population? (20 points)

國立中山大學九十學年度碩博士班招生考試試題

科目：普通植物學【海生所碩士班】選考

Assay question:

a. Illustrate the plant cell (including cell wall and organelle) (20%).

b. Please explain electron transport and chlorophyll a fluorescence. (15%)

c. Please explain "stress" concept in plant research and give one example to show how plants tolerate the stress (10%)

d. Please explain "biomass" and "productivity" and list the methods in the measurement of plant community? (15%)

e. Explain the biodiversity (10%)

f. Explain the water potential. (10%)

g. Do you know "plant hormone"? Please explain it and give five kinds of plant hormone (20%)

國立中山大學九十學年度碩博士班招生考試試題

科目：動物生理學【海生所碩士班】選考

(A) 解釋名詞 (每題 3 分)

1. structural gene
2. facilitated diffusion
3. paracrine
4. calmodulin
5. corpus callosum
6. equilibrium potential
7. tetanus
8. tidal volume
9. ketone body
10. endogenous pyrogen

(B) 問答題 (每題 7 分)

1. What is the all-or-none nature of the action potential?
2. What is the relationship of temporal summation to the excitation of neuron?
3. Describe the neural control of hypothalamic releasing hormone.
4. What is the importance of refractory period in maintaining cardiac function?
5. What are the general causes of hypotension?
6. Describe the effect of acidity on the oxygen-hemoglobin dissociation curve.
7. Summarize the tubular mechanism for handling water by the kidney.
8. List the factors that prevent the stomach from self-digestion.
9. Describe the hormonal control of ovulation.
10. Describe the interactions of IgE and mast cells in immediate hypersensitivity.