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國立高雄大學九十三年學年度研究所碩士班招生考試試題

系所組別：生物科技研究所

科目：英文

**I. Vocabulary in Context (20%)**

Read the passage and choose the word or phrase that completes the sentence.

1. In law, a nuisance is an act that has no legal justification and which interferes with the safety or comfort of other people. Public nuisances, those which are injurious to the community, may be prosecuted as crimes.

A public nuisance is

(A) a protective law (B) an injurious act (C) a legal justification (D) a safety precaution

2. Waste that has been made useful is said to have been recycled. Empty bottles can be returned and used again. Other things that can be recycled are paper, plastic, and metals. Besides the aesthetic value of recycling, there are many environmental reasons to do so.

Recycled material is

(A) strewn garbage (B) common waste materials (C) paper, glass, and coffee (D) reused waste

3. Seventeenth-century attempts to preserve anatomical specimens brought about modern embalming, the preservation of the body after death by artificial chemical means. The most common agent used today is formaldehyde, which is infused to replace body fluids.

Embalming is

(A) death by a chemical means (B) the preservation of anatomical specimens (C) a common agent related to formaldehyde (D) the replacement of body chemicals

4. A composer indicates to a musician how a musical passage is to be played through the use of dynamic markings. The symbol for soft is *p*, whereas the one for loud is *f*. The intensity—loudness or softness—depends on the extent or amplitude of the vibrations made by the particular instrument being played.

Intensity is

(A) dynamic markings (B) the symbol for soft and loud (C) the extent of the vibrations (D) loudness or softness

5. Oral history, the use of the tape recorder to capture memories of the past in private interviews, has become increasingly popular among professional historians. Studs Terkel is the best known of American historians to use this method for recording historical events. He interviewed people about their experiences during important events such as the Great Depression and World War II.

Oral history is

(A) private interviews (B) the recording of people's memories (C) experiences during important events (D) the history of tape recording

6. According to many psychologists, phobias, or irrational fears, represent or are symbolic of repressed anxiety. They are usually persistent, illogical, and intense. The most useful treatment has been through behavior-modification therapy.

A phobia is

(A) a psychologist (B) a fear (C) a symbol (D) a treatment

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7. The nervous system of an animal is not a simple electrical circuit. When a signal gets to one end of a nerve cell, the cell sprays various molecules out for the next cell to pick up. The central nervous system of grasshoppers, fruit flies, and other insects includes both the brain and a chain of simpler segmental ganglia, or groups of nerve cells.

Ganglia are

(A) nervous systems (B) electrical circuits (C) groups of nerve cells (D) the molecules that the cells send out

8. The Pueblo Indians are those who dwell in pueblos, a name derived from the Spanish word for "village." The pueblo is usually built against the face of a cliff and generally consists of connected houses rising in a series of receding terraces. The roof of one house is the yard or patio of the next house. The kiva, where Pueblo Indians hold their secret ceremonies, is entered by an opening in the roof.

A kiva is a

(A) patio (B) ceremonial room (C) series of terraces (D) Pueblo Indian village

9. At least fifty weed species fight off competitors by emitting toxins from their roots, leaves, or seeds. These poisons do their work in different ways, such as inhibiting germination of seeds and destroying photosynthesis abilities.

Toxins are

(A) roots (B) leaves (C) seeds (D) poisons

10. While the methods used at other learning institutions are based on the theory that children need a teacher, the Montessori method is based on the theory that a child will learn naturally if placed in an environment rich in learning materials to play with.

These materials are suited to children's abilities and interests, and learning takes place as the child plays. Children following this method are autodidactic, and only when a child needs help does the teacher step in.

Autodidactic is

(A) playful (B) self-taught (C) able to learn (D) dependent on teachers

**II. Grammar (20%)**

Each of the following sentences has four underlined parts marked A, B, C, and D. Identify the part of the sentence that is incorrect.

11. It was not until 1937 when the southernmost source of the Nile River was discovered.

A B C D

12. Platinum is a rare and value metal, white in color, and easy to work.

A B C D

13. During the two centuries between Herschel and *Voyager*, relatively little learned about the planet Uranus.

A B C D

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14. Some conservationists attempt to save rare domestic farm animal, such as the  
 A B C D  
 Tamworth pig.

15. The head proctor tells the students when they should begin the exam, how long  
 A  
they have to complete it, and what the procedures are for turning in.

B C D  
 16. The bodies of cold-blooded animals have the same temperature their  
 A B C  
 surroundings, but those of warm-blooded animals do not.  
 D

17. The oceans contain many forms of life that has not yet been discovered.  
 A B C D

18. Before 1992, Bobby Fischer had not played in other chess tournament since  
 A B C  
 winning the Chess World Championship in 1972.  
 D

19. Perhaps was his defiance against his parents' attitude that led Salvatore  
 A B C  
 Ferragamo to fame as the shoemaker for the world's most famous women.  
 D

20. The United Nations Organization maintains what water will be at the heart of  
 A B  
many future international disputes.  
 C D

III. Reading Comprehension (60%)

This section contains reading passages and questions about the passages. Read the passages carefully and choose the best answer to each of the questions.

The influenza virus is a single molecule composed of millions of individual atoms. Although bacteria can be considered a type of plant, secreting poisonous substances into the body of the organism they attack, viruses, like the influenza virus, are living organisms themselves. We may consider them regular chemical molecules since they have strictly defined atomic structure; but on the other hand, we must also consider them as being alive since they are able to multiply in unlimited quantities.

An attack brought on by the presence of the influenza virus in the body produces a temporary immunity, but, unfortunately, the protection is against only the type of virus that caused the influenza. Because the disease can be produced by any one of three types, referred to as A, B, or C, and many varieties within each type, immunity to one virus will not prevent infection by other types or strains. Protection from the influenza virus is also complicated by the fact that immunity to a specific virus may periodically change characteristics. The problem of mutation makes it difficult to carry out a successful immunization program. Vaccines are often ineffective against newly evolving strains.

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Approximately every ten years, worldwide epidemics of influenza called pandemics occur. Thought to be caused by new strains of type-A virus, these pandemic viruses have spread rapidly, infecting millions of people.

Vaccines have been developed that have been found to be 70 to 90 percent effective for at least six months against either A or B types of the influenza virus, and a genetically engineered live-virus vaccine is under development. Currently, the United States Public Health Service recommends annual vaccination only for those at greatest risk of complications from influenza, including pregnant women and the elderly. Nevertheless, many other members of the general population request and receive flu shots every year, and even more are immunized during epidemic or pandemic cycles.

21. Which of the following is the main topic of the passage?  
 (A) The influenza virus (B) Immunity to disease (C) Bacteria (D) Chemical molecules
22. According to this passage, bacteria are  
 (A) poisons (B) very small (C) larger than viruses (D) plants
23. The word "strictly" in line 5 could be best replaced by  
 (A) unusually (B) completely (C) broadly (D) exactly
24. The atomic structure of viruses  
 (A) is variable (B) is strictly defined (C) cannot be analyzed chemically (D) is more complex than that of bacteria
25. Why does the author say that viruses are alive?  
 (A) They have a complex atomic structure. (B) They move. (C) They multiply. (D) They need warmth and light.
26. The word "unlimited" in paragraph 1 could best be replaced by which of the following?  
 (A) very small (B) very large (C) very similar (D) very different
27. According to the passage, how does the body react to the influenza virus?  
 (A) It prevents further infection to other types and strains of the virus. (B) It produces immunity to the type and strain of virus that invaded it. (C) It becomes immune to types A, B, and C viruses, but not to various strains within the types. (D) After a temporary immunity, it becomes even more susceptible to the type and strain that caused the influenza.
28. The passage discusses all of the following as characteristics of pandemics EXCEPT  
 (A) they spread very quickly (B) they are caused by type-A virus (C) they are regional outbreaks (D) they occur once every ten years.

\* \* \* \* \*

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The Federal Reserve System, as an independent agency of the United States government, is charged with overseeing the national banking system. Since 1913 the Federal Reserve System, commonly called the Fed, has served as the central bank for the United States. The system consists of twelve District Reserve Banks and their branch offices, along with several committees and councils. All national commercial banks are required by law to be members of the Fed, and all deposit-taking institutions like credit unions are subject to regulation by the Fed regarding the amount of deposited funds that must be held in reserve and that by definition, therefore, are not available for loans. The most powerful body is the seven-member Board of Governors in Washington, appointed by the President and confirmed by the Senate.

The System's primary function is to control monetary policy by influencing the cost and availability of money and credit through the purchase and sale of government securities. If the Federal Reserve provides too little money, interest rates tend to be high, borrowing is expensive, business activity slows down, unemployment goes up, and danger of recession is augmented. If there is too much money, interest rates decline, and borrowing can lead to excess demand, pushing up prices and fueling inflation.

The Fed has several responsibilities in addition to controlling the money supply. In collaboration with the U.S. Department of the Treasury, the Fed puts new coins and paper currency into circulation by issuing them to banks. It also supervises the activities of member banks abroad, and regulates certain aspects of international finance.

It has been said that the Federal Reserve is actually a fourth branch of the United States government because it is composed of national policy makers. However, in practice, the Federal Reserve does not stray from the financial policies established by the executive branch of the government. Although it is true that the Fed does not depend on Congress for budget allocations, and therefore is free from

the partisan politics that influence most of the other governmental bodies, it is still responsible for frequent reports to the Congress on the conduct of monetary policies.

29. Which of the following is the most appropriate title for the passage?  
(A) Banking (B) The Federal Reserve System (C) The Board of Governors (D) Monetary Policies
30. The word "overseeing" in paragraph 1 is closest in meaning to  
(A) supervising (B) maintaining (C) financing (D) stimulating
31. The word "confirmed" in paragraph 1 could be best replaced by  
(A) modified (B) considered (C) examined (D) approved
32. According to the passage, the principal responsibility of the Federal Reserve System is  
(A) to borrow money (B) to regulate monetary policies (C) to print government securities (D) to appoint the Board of Governors
33. The word "securities" in paragraph 2 is intended to mean  
(A) debts (B) bonds (C) protection (D) confidence



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34. What happens when the Federal Reserve provides too little money?  
 (A) Demand for loans increases. (B) Unemployment slows down. (C) Interest rates go up. (D) Businesses expand.
35. In paragraph 2, the author suggests that inflation is caused by  
 (A) high employment rates (B) too much money in the economy (C) very high fuel prices (D) a limited supply of goods
36. What does the author mean by the statement, "However, in practice, the Federal Reserve does not stray from the financial policies established by the executive branch of the government?"  
 (A) The Fed is more powerful than the executive branch of the government. (B) The policies of the Fed and those of the executive branch of the government are not the same. (C) The Fed tends to follow the policies of the executive branch of the government. (D) The Fed reports to the executive branch of the government.
37. All of the following statements could be included in a summary of the passage EXCEPT:  
 (A) The Federal Reserve is an independent agency of the United States government. (B) The Federal Reserve controls the flow of money and credit by buying and selling government securities. (C) The Federal Reserve issues new coins and currency to banks. (D) The Federal Reserve receives its yearly budget from Congress.

\* \* \* \* \*

The fact that most Americans live in urban areas does not mean that they reside in the center of large cities. In fact, more Americans live in the suburbs of large metropolitan areas than in the cities themselves.

The Bureau of the Census regards any area with more than 2,500 people as an urban area and does not consider boundaries of cities and suburbs. According to the Bureau, the political boundaries are less significant than the social and economic relationships and the transportation and communication systems that integrate a locale. The term used by the Bureau for an integrated metropolis is an MSA, which stands for Metropolitan Statistical Area. In general, an MSA is any area that contains a city and its surrounding suburbs and has a total population of 50,000 or more.

At the present time, the Bureau reports more than 280 MSAs, which together account for 75 percent of the US population. In addition, the Bureau recognizes

eighteen megapolises, that is, continuous adjacent metropolitan areas. One of the most obvious megapolises includes a chain of hundreds of cities and suburbs across ten states on the East Coast from Massachusetts to Virginia, including Boston, New York, and Washington, D. C. In the Eastern Corridor, as it is called, a population of 45 million inhabitants is concentrated. Another megapolis that is growing rapidly is the California coast from San Francisco through Los Angeles to San Diego.

38. Which of the following is the best title for the passage?  
 (A) Metropolitan Statistical Areas (B) Types of Population Centers (C) The Bureau of the Census (D) Megapolises

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39. According to the passage, where do most Americans live?  
(A) In the center of cities (B) In the suburbs surrounding large cities (C) In rural areas (D) In small towns
40. According to the Bureau of the Census, what is an urban area?  
(A) An area with 2,500 people or more (B) An area with at least 50,000 people  
(C) The eighteen largest cities (D) A chain of adjacent cities
41. Which of the following are NOT considered important in defining an urban area?  
(A) Political boundaries (B) Transportation networks (C) Social relationships (D) Economic systems
42. The word "integrate" in paragraph 2 is closest in meaning to  
(A) benefit (B) define (C) unite (D) restrict
43. The word "its" in paragraph 2 refers to  
(A) the MSA's (B) the area's (C) the city's (D) the population's
44. The word "adjacent" in paragraph 3 is closest in meaning to  
(A) beside each other (B) growing very fast (C) the same size (D) densely populated
45. According to the passage, what is a megapolis?  
(A) One of the ten largest cities in the United States (B) One of the eighteen largest cities in the United States (C) One of the one hundred cities between Boston and Washington (D) Any number of continuous adjacent cities and suburbs
46. Why does the author mention the Eastern Corridor and the California coast in paragraph 3?  
(A) As examples of megapolises (B) Because 75 percent of the population lives there (C) To conclude the passage (D) The Bureau of the Census is located there

\* \* \* \* \*

Jacob Epstein's sculptures were the focus of much controversy during the sculptor's lifetime. Epstein was born in the United States of Russian-Jewish immigrants in 1880. He moved to Paris in his youth and later to England, where he eventually settled and took out British citizenship in 1907. His first major public commission, on a building in London, offended public taste because of the expressive distortion and nudity of the figures. In 1937, the Rhodesian government, which at that time owned the building, actually mutilated the sculptures to make them conform to the notions of decency. Many of Epstein's monumental carvings received equally adverse criticism. While the general public denounced his work, many artists and critics praised it. They admired in particular the adversity of his work and noted the influence on it of primitive and ancient motifs from Africa and the Pacific. Today, Epstein's work has received the recognition it deserves, and Epstein is considered one of the major sculptors of the twentieth century.

47. Concerning Epstein's work, the tone of the article is  
(A) critical (B) derisive (C) amusing (D) admiring

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48. Which of the following was most probably an important influence on Epstein's work?  
(A) Russian painting (B) Public tastes (C) The Rhodesian government (D) African carvings
49. Today, a newly erected Epstein sculpture would probably  
(A) be mutilated (B) conform to public opinions (C) be well received (D) be expressive
50. What does the author mean by the statement, "Many other Epstein's monumental carvings received equally adverse criticism"?  
(A) Many of Epstein's monuments have been defaced (B) People have taken equal offense to other critical works of art. (C) Epstein's monuments are usually denounced for their nudity. (D) Other sculptures of Epstein's have elicited negative comments.



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- I. 解釋名詞 (20%)
- (1) Glycosaminoglycans;
  - (2) Cytochrome P-450;
  - (3) Metabolon;
  - (4) Futile cycle;
  - (5) Z-scheme of photosynthesis.
  - (6)  $K_m$
  - (7)  $\Omega$  loop
  - (8) Chaperone
  - (9) Triple-helical DNA
  - (10) Ganblioside
- II. Mackinnon R 的鉀離子通道機制獲得 2003 年諾貝爾化學獎。就結構及能量觀點，說明鉀離子通道具有選擇性(selectivity)的機制。(10%)
- III. 當運動時需要大量的能量—ATP。從代謝觀點，隨著運動時間的增長，說明提供 ATP 主要來源的先後順序：anaerobic metabolism，creatine phosphate 及 aerobic metabolism。(10%)
- IV. 在缺氧下，腫瘤細胞(tumor cells)如何改變基因表現，獲得碳源達到增生的目的。(10%)
- V. 存在細胞膜的 phospholipase C 經 G protein 活化後，水解 phosphatidyl inositol 4,5-bisphosphate ( $PIP_2$ )成兩個 secondary messengers—inositol 1, 4, 5-triphosphate ( $IP_3$ )與 diacylglycerol (DAG)。試說明  $IP_3$  與 DAG 在活化不同的細胞反應時，鈣離子所扮演的角色。(10%)
- VI. 概述 Proteomics 主要研究之三個領域。(10%)
- VII. mitochondra DNA 容易受傷之原因。mitochondra DNA 與 endosymbiotic theory 之關係為何。(10%)
- VIII. 就酵素調節機制 (如受質含量、產物抑制及異位回饋抑制等) 來說明 citric acid cycle 之調控。(10%)
- IX. 為何  $\beta$ -amino acid 不被用於合成蛋白質？為何在蛋白質 folding 時 X-proline peptide 鍵會造成問題。(10%)

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- Please describe the following terms. (7 points for each)
  - DNA microarray
  - Apoptosis
  - Nucleosome
  - hnRNA
  - Transposon
  - Pseudogene
  - RNA interference (RNAi)
- Please describe the process of DNA replication and the process by which the information in a gene is transcribed and translated into a protein. (15 points)
- Please describe the mechanism of *E. coli* DNA repair system (UvrABC). (10 points)
- There are three major physical techniques, including restriction mapping, fluorescent *in situ* hybridization (FISH), and sequence tagged site mapping (STS), have been used to reveal the genetic information on genome projects. Please describe the principles of these techniques and also compare the advantage and disadvantage with one another. (10 points)
- A scientist is interested in the biosynthetic pathway of compound X and isolate ten different (independently isolated) mutants of *E. coli* that require compound X for growth. The mutations are mapped and their approximate positions are giving as Fig 1.

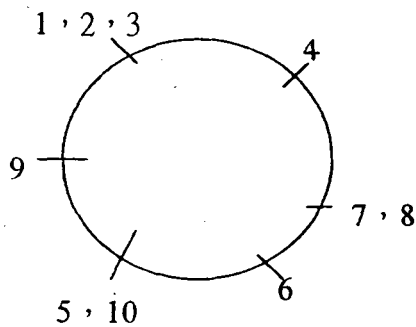


Fig 1

	Mutants						
	1	2	3	4	5	6	7
1	-	+	+	+	+	+	-
2		-	+	-	+	+	+
3			-	+	+	-	+
4				-	+	+	+
5					-	+	+
6						-	+
7							-

Table 1

- What is the minimum number of genes involved in the synthesis of compound X? Why must your answer be the minimum estimate? (8 points)
- The complementation show as table 1 are observed. The numbers refer to particular mutations (**not** mutant positions number in fig 1). The symbols + and - indicate that the two mutations do and do not complement, respectively. How many genes are represented? Assign the mutations to the genes. (8 points)