高雄醫學大學 100 學年度研究所招生考試試卷

系所: 醫學系醫學遺傳學科碩士班
科目: 生理學

問答題：

1. 帶電離子(ions)可藉由主動和被動的方式通過細胞膜，請舉例說明並比較兩種方式作用機轉的異同。(12%)
2. 請說明何謂基因轉錄(genetic transcription)及其過程。(12%)
3. 請描述大腦不同腦葉(lobes)的主要生理功能。(16%)

(4～8 題，請選擇 3 題作答，每題 20 分。勿作答超過 3 題，否則以前 3 題計分。)

4. 在肌漿質中，鈣離子(Ca^{2+})濃度急遽上升是骨骼肌和平滑肌收縮時所必需。請比較這兩種肌肉的Ca^{2+}來源及其角色(亦即如何引起收縮)。
5. 請解釋心電圖(ECG or EKG)中的 P 波、QRS 波和 T 波是因為何種心臟活動而形成，並說明出現第一心音和第二心音的原因以及與這些波形的關連性。
6. 請說明類固醇激素(steroid hormone)和甲狀腺素(thyroxine)在標的細胞上透過何種作用機制發揮效果。
7. 請列出由腦下腺前葉(anterior pituitary)分泌的六種荷爾蒙並說明其功能。
8. 請解釋何謂潮氣容積(tidal volume)和肺活量(vital capacity)，並說明如何計算每分鐘換氣量(total minute volume or minute ventilation)，運動對此數值有何影響以及為什麼。

高雄醫學大學 100 學年度研究所招生考試試卷 系所：碩士班 科目：英文

NOTE: on your answer sheet, find the number of the question and mark your answer.

I. SENTENCE COMPLETION: You are to choose the word or phrase that best completes the sentence. 20%

1. Joe is really creative fashion designer. He can always be relied on to ____ new ideas.
   (A) put up with (B) come up with (C) face up with (D) draw to
2. Everyone admired Dr. Victor Chang, the brilliant heart transplant surgeon. He was respected _____the world.
   (A) outside (B) over (C) throughout (D) through
3. At the end of the century, the Y2Kcomputer virus could have caused ____ in information systems worldwide.
   (A) problem (B) chaos (C) stoppage (D) fright
4. Have you ever ____ about a career in the electronics industry? I think you would be very successful.
   (A) thought (B) spoken (C) discussed (D) considered
5. I love springtime, when the mountains are covered in wild flowers. It's the most ____ time of the year.
   (A) awful (B) delightful (C) painful (D) fruitful
6. We've having a college reunion next week. ____ you like to join us?
   (A) Will (B) Can (C) Could (D) Would
7. Sometimes I get sick of studying, but I know it will be ____ it in the end.
   (A) good (B) useful (C) worth (D) worthwhile
8. It's very ____ when someone uses a cell phone during a movie because it disturbs other people.
   (A) annoyed (B) interesting (C) annoying (D) frustrated
9. ____ my grandfather is 85 years old, he still walks miles everyday.
   (A) Even (B) Despite (C) Although (D) However
10. That's the last time I'll go to that restaurant. The food made me ____ and I had to see a doctor.
    (A) angry (B) sad (C) unhappy (D) sick

II. CLOZE TEST: This passage contains several missing words or phrases. You are to choose the best answer for each missing word or phrase in the passage. 10%

The small Greek island of Eleni is not popular with tourists because it is isolated and difficult to get to. There are only two ferry services a week from Athens and the trip _(11)_ eleven hours. Nevertheless, it was the ideal _(12)_ for me to take the quiet vacation that I had dreamed about for so long. On the first evening, I sat on a sandy beach admiring the beauty of the sea and _(13)_ the

peaceful atmosphere. The air was clear and warm and everything was bathed in the orange rays of the setting sun that was slowly disappearing (14) the western horizon. A few small boats could be seen returning to harbor with their cargoes of freshly caught fish. As I sat there relaxing, I realized that I did not miss the city life with all its pressure and noise and I thought to myself: "I wish I (15) stay here forever."

11. (A) is taking (B) takes (C) to take (D) taking
12. (A) city (B) home (C) place (D) continent
13. (A) hating (B) thinking (C) enjoying (D) watching
14. (A) below (B) over (C) between (D) beside
15. (A) ought to (B) should (C) could (D) would

III. WRITTEN EXPRESSION: In questions 16-20each sentence has four underlined words or phrases. Identify the one underlined word or phrase that must be changed in order for the sentence to be correct. 10%

16. Until the 1910 formation (A) of the National Hockey Association in eastern Canada, professional and amateur (B) teams were (C) allowed to playfully (D) together.
17. Widely acknowledged as a great (A) and import playwright, Eugene O'Neill brought to the United States stage it (B) was probably its first (C) really serious drama (D).
18. The first known (A) radio program among (B) the United States was (C) broadcast on Christmas Eve, 1906, by Reginald Fessenden from his experimental (D) station at Brant Rock, Massachusetts.
19. A typical (A) feature-length film costs (B) millions of dollars to make (C) and requires the skillful (D) of hundreds of workers.
20. Tilling means preparation (A) the soil to plant (B) the seeds and keeping the soil in (C) the best condition to help the crop grow until it is (D) ready for harvesting.

IV. COMPREHENSION QUESTION: read each passage and answer questions. 60%

The dulcimer is a musical instrument that basically consists of a wooden box with strings stretched across it. The name *dulcimer* is derived from the Latin word *dulcis* (sweet) and the Greek word *melos* (song). In one form or another, dulcimers have been around since ancient times. Their earliest ancestor was a Persian instrument called the santir. Dulcimer-like instruments were played throughout the Middle East and North Africa and were brought by Arab musicians to Spain. From Spain, the instrument spread throughout Europe and eventually to North America.

Today there are two main types of dulcimers played in the United States: the hammered dulcimer and the Appalachian, or mountain, dulcimer. The hammered dulcimer is shaped like a

trapezoid and is played by striking the strings with small wooden hammers called mallets. On the hammered dulcimer, there are sets of two, three, or four strings, called courses, which are struck at one time to sound each note. There are from twelve to twenty-two courses on a standard hammered dulcimer. The hammered dulcimer is usually categorized as belonging to the zither family of string instruments, although some musicologists challenge this classification.

The Appalachian dulcimer's immediate ancestors include the German scheitholt, the French epinette, and perhaps the Swedish hummel. It is classified as a member of the lute family of instruments. Appalachian dulcimers are painstakingly crafted by artisans, mainly in the mountain areas of West Virginia, Kentucky, Tennessee, and Virginia. They have three strings-the melody, middle, and bass string. Sometimes a second melody string is added. This instrument is played by plucking the strings with the fingers or with quills. They are shaped like teardrops or hourglasses. Heart-shaped holes in the sounding boards are traditional. Most performers play the instrument while seated with the instruments in their laps, but others wear them around their necks like guitars or place them on tables in front of them. Before the 1960's, the Appalachian dulcimer had a limited appeal. It was usually associated with dance music and with "hillbilly" music. However, the instrument was popularized by musicians such as Jean Richie and Richard Farina during the folk music revival of the 1960's and is today featured in many types of music.

21. The author says that the word dulcimer
    (A) means "wooden box" (B) was not used until the 1960's
    (C) means "sweet song" in Persian (D) comes from two languages
22. What is the greatest number of notes that could be played on a standard hammered dulcimer?
    (A) Three (B) Four (C) Twelve (D) Twenty-two
23. According to the passage, experts do NOT all agree that the
    (A) Appalachian dulcimer is a member of the lute family
    (B) hammered dulcimer should be classified as a string instrument
    (C) hammered dulcimer is a member of the zither family
    (D) Appalachian dulcimer had a limited appeal before 1960
24. Which of these instruments could NOT be considered an ancestor of the Appalachian dulcimer?
    (A) The zither (B) The epinette (C) The santir (D) The scheitholt
25. According to the passage, how many strings does the Appalachian dulcimer have?
    (A) One or two (B) Three or four (C) Four or five (D) Six or more
26. According to the passage, most musicians play the Appalachian dulcimer
    (A) while sitting down (B) with the instrument around their necks
    (C) while standing next to tables (D) with wooden hammers
27. According to the passage, Jean Richie and Richard Farina are known for
    (A) playing dance music and "hillbilly" music
    (B)designing and building Appalachian dulcimers
    (C) helping to bring more attention to dulcimers
    (D) beginning the folk music revival of the 1960's

Pigeons have been taught to recognize human facial expressions, upsetting long-held beliefs that only humans have evolved the sophisticated nervous systems needed to perform such a feat. In recent experiments at the University of Iowa, eight trained pigeons were shown photographs of people displaying emotions of happiness, anger, surprise, and disgust. The birds learned to distinguish between these expressions. Not only that, but they were able to correctly identify the same expressions on photographs of unfamiliar faces. Their achievement does not suggest, of course, that the pigeons had any idea what the human expressions meant.

Some psychologists had theorized that, because facial expression is vital to human communication, humans have developed special nervous systems capable of recognizing subtle differences between expressions. Now the pigeons have cast doubt on that idea.

In fact, the ability to recognize facial expressions of emotion is not necessarily innate even in human babies, but may have to be learned in much the same way that pigeons learn. In experiments conducted several years ago the University of Iowa, it was found that pigeons organize images of things into many of the same logical categories that humans do.

None of these results would come as any surprise to Charles Darwin, who long ago wrote about the continuity of mental development from animals to humans.

28. From the information in paragraph 1, it can be inferred that pigeons
    (A) show more emotions than people thought they could
    (B) can understand the human emotions of happiness, anger, surprise, and disgust
    (C) can identify only the expressions of people that they are familiar with
    (D) have more sophisticated nervous systems than was once thought
29. The author probably believes that the psychologists mentioned in paragraph 2
    (A) will need to revise their theory
    (B) no longer believe that expressions are important in human communication
    (C) have conducted their own experiments with pigeons
    (D) no longer think that the pigeons have cast doubt on their theories
30. In paragraph 3 , the author suggests that, at birth, human babies
    (A) have nervous systems capable of recognizing subtle expressions
    (B) can learn from pigeons
    (C) are not able to recognize familiar faces
    (D) may not be able to identify basic emotions through facial expressions
31. What can be inferred about the experiments that were conducted several years ago at the University of Iowa ?
    (A) They were completely contradicted by more recent experiments.
    (B) They supported the idea that pigeons and humans share certain mental abilities.
    (C) They were conducted by scientists on human babies.
    (D) They proved that animals other than pigeons could recognize human expressions.

32. If Charles Darwin could have seen the results of this experiment, his most probable reaction would have been one of _____ .
(A) rejection (B) surprise (C)agreement (D)amusement

The 1960's saw a rising dissatisfaction with the modernist movement in architecture, especially in North America, where its failings were exposed in two influential books, Jane Jacobs's *The Death and Life of Great American Cities* in 1961 and Robert Venturi's *Complexity and Contradiction in Architecture* in 1966. Jacobs highlighted the destruction of the richness and variety of America that occurred as a result of the urban renewal programs sponsored by the federal government. She went on to say that these historic buildings were being replaced by massive, impersonal buildings. Venturi implied that modernist structures were without meaning because they lacked the complexity and intimacy of historical buildings. Both writers called for a new style of architecture.

By the early 1980's, post-modernism had become the dominant style, particularly for public buildings in the United States. Post-modernism evolved from modernism and yet it is a contradiction of that style. In fact, post-modernists have little in common with one another in terms of style or theory. They are united mainly in their opposition to the modernist style. One quality that is common to many post-modernist buildings is characterized by what architect Peter Jencks calls "double coding," a mixture of two styles: modern mixed with tradition, contemporary with historical, functional with decorative, and familiar with newly invented. These characteristics can be seen in Robert Venturi's bold designs for the Brant-Johnson House (1975) in Vail, Colorado, which mixes contemporary and Italian Renaissance style. Similar characteristics are clear in the work of Venturi's disciple Michael Graves's Portland Building (1982) in Portland, Oregon, and his Humana Tower (1986) in Louisville, Kentucky, have the bulk of skyscrapers but incorporate historical souvenirs such as colonnades, belvederes, keystones, and decorative sculpture. Likewise, Robert Stern's Observatory Hill Dining Hall (1984) at the University of Virginia in Charlottesville, Virginia, combines the red brick and white wood of Thomas Jefferson's original plan for university building with modern building forms and walls with large windows. Chinese-American architect I. M. Pei's design for an addition to the Louvre Museum in Paris (1989) included a glass pyramid, referring to the Egyptian art in the Louvre and the fact that French emperor Napoleon Bonaparte played a major role in making Egypt a subject of study in the early 1800's.

Another major tendency in post-modern architecture is the emphasis on decoration, which modernism eliminated. This can be seen in the works of Phillip Johnson, who was once a champion of modernism but became an out-spoken advocate of post-modernism. He wrapped the AT&T building (1984), which is now the SONY Building, in New York City, in pinkish granite and topped it with a tower that looks like an enormous piece of Chippendale furniture. Some architects turned entire building into sculptures. Frank Gehry's monumental Guggenheim Museum in Bilbao, Spain (1997), resembles an enormous abstract sculpture made of glass and titanium steel.

Glossary

Chippendale: an ornate style of furniture first developed in Britain in the eighteenth century

33. Which of these statements best expresses the opinion of Jane Jacobs and Robert Venturi as given in paragraph 1 ？
    (A) Post-modern buildings are massive and impersonal.
    (B) Modernist architecture is rich and varied
    (C) The federal government should increase its urban renewal efforts.
    (D) Modernism should be replaced by some other style of architecture.
34. The primary purpose of the second paragraph is to
    (A) explain "double coding" and give examples of various combinations of styles
    (B) describe several features of skyscrapers
    (C) discuss how Pei's pyramid refers to Napoleon Bonaparte and his study of Egyptian culture
    (D) show how post-modernism evolved from modernism
35. The author probably uses the word *souvenirs* in paragraph 2 because
    (A) tourists often visit the Portland Building and the Humana Building and buy souvenirs
    (B) the Portland Building and the Humana Building now exist only in people's memories
    (C) some features of the Portland Building and the Humana Building remind people of the past
    (D) the Portland Building and the Humana Building house important museums
36. The author presents details about the AT&T (now the SONY) building in New York City to show that it
    (A) resembles an abstract sculpture (B) influenced post-modern furniture design
    (C) was built when Johnson was modernist architect (D) has ornamental architectural features

In April 187, an art exhibit opened in Paris featuring famous and priceless works of art. However, at the time, no one knew that these paintings would one day be considered masterpieces. The paintings and the painters were virtually unknown at the time and would remain that way for several years. (Paragraph 1)

In the nineteenth century, French art was dominated by the Academy of Fine Arts. Every year the academy held an art show called *Le Salon*. In 1863, the Academy rejected one of the paintings of Edouard Manet. Manet and a group of other independent artists organized their own show, which they called *Salon des Refuses* (Salon of the Rejected), which opened on April 15, 1874. A newspaper critic maned Louis l Leroy visited the gallery and was not pleased with what he saw. One painting of boats in a harbor at dawn by Claude Monet particularly enraged him. It was called *Impression: Sunset.* Leroy wrote that this piece and in fact most of the pieces in the show, looked like "impressions"—a term for a preliminary, unfinished sketch made before a painting is done. Leroy's newspaper review was jokingly called "The Exhibition of the Impressionists." Within a few years of Leroy's review, the term *Impressionists* had clearly stuck, not as a term of derision but as a badge of honor, and a new movement was born. (Para 2)

The Impressionist movement included the French painters Edouard Manet, Claude Monet, Pierre-Auguste Renoir, Edgar Degas, Paul Cezanne, and the American painter Mary Cassatt. The

techniques and standards employed within the Impressionist movement varied widely, and though the artists shared a core of values, the real glue which bound the movement together was its spirit of rebellion and independence. (Para 3)

This spirit is clear when you compare Impressionist paintings with traditional French paintings of the time. Traditional painters tended to paint rather serious scenes from history and mythology. Many Impressionist paintings feature pleasant scenes of urban life, celebrating the leisure time that the Industrial Revolution had won for the middle class, as shown in Renoir's luminous painting *Luncheon of the Boating Party.* In that famous painting, the sun filters through the orange-striped awning, bathing everything and everyone at the party in its warm light. Renoir once said that paintings should be "…likable, joyous, and pretty." He said, "There are enough unpleasant things in this world. We don't have to paint them as well." It is this joy of life that makes Renoir's paintings so distinctive. (Para 4)

The Impressionists delighted in painting landscapes (except for Edgar Degas, who preferred painting indoor scenes, and Mary Cassatt, who mainly painted portraits of mothers and children). Traditional painters, too, painted landscapes, but their landscapes tended to be somber and dark. The Impressionists' landscapes sparkle with light. Impressionists insisted that their works be "true to nature." When they painted landscapes, they carried their paints and canvases outdoors in order to capture the ever-changing light. Traditional painter generally made preliminary sketches outside but worked on the paintings themselves in their studios. (Para 5)

"Classic" Impressionist paintings are often easy to spot because of the techniques used by the painters. One of the first "rules" of the Impressionist, that the colors should be dropped pure on the canvas instead of getting mixed on the palette, was respected by only a few of them and for only a couple of years, but most Impressionists mixed their paints as little as possible. They believed that it was better to allow the eye to mix the colors as it viewed them on the canvas. The traditional technique at the time was to make sketches or outlines of the subject before painting them. Generally, Impressionists painted directly onto the canvas without sketches. Impressionists tended to paint with short, thick strokes of paints shaped like commas. While traditional painters paid attention to details, Impressionists valued overall effect. Traditional painters always tried to hide their brush strokes, but Impressionists left brush strokes on the canvas for the world to see. Unlike traditional painters, Impressionists applied one layer of paint on top of the last one without waiting for the paint to dry. These techniques created paintings that seemed strange and unfinished to the general public when they were first painted, but are much loved in our time. (Para 6)

37. What point does the author make about the art show that opened on April 15, 1874, at the Salon des Refuses in Paris？
    (A) It was more popular with visitors and critics than the official show called "Le Salon."
    (B) It made the painters and paintings shown there instantly successful.
    (C) Its organizers refused to allow Edouard Manet to display his paintings there.
    (D) It featured famous paintings and painters before they became well known.
38. The word virtually in the passage is closest in meaning to the word _____.

(A) almost (B) infinitely (C) seemingly (D) forever

39. According to the author, Louis Leroy used the term “Impressionists” because _____ .
(A) he understood that these artists did not carefully study their subjects, but only got a quick impression of what they painted
(B) he thought that Monet’s painting, and all of the paintings at the show, looked like unfinished drawings
(C) he believed that giving these artists a group name would help them become famous
(D) he thought that the painting *Impression: Sunset* was the best painting at the show

40. The word derision in the passage is closest in meaning to
(A) ridicule (B) sincerity (C) respect (D) sorrow

41. Renoir’s painting *Luncheon of the Boating Party* is given in paragraph 4 as an example of
(A) an industrial scene (B) a study of some urban buildings
(C) a picture of people enjoying their leisure time (D) a traditional French painting

42. According to the information in paragraph 5, what did the painters Edgar Degas and Mary Cassatt have in common?
(A) They both painted portraits of children and mothers.
(B) Neither of them was originally from France.
(C) Neither of them was primarily interested in landscapes.
(D) They both preferred painting unpleasant scenes.

43. According to paragraph 5, when traditional painters worked on landscape paintings, they
(A) studied the ever-changing light (B) did not make any preliminary sketches
(C) never left their studios (D) sketched outdoors but painted indoors

44. It can be inferred from the information in paragraph 6 that in the author’s view, the first “rule” of Impressionism _____ .
(A) was not really a rule at all (B) was the most important rule of all
(C) led Impressionists to mix their colors (D) lasted longer than other rules

45. The phrase the last one in the passage refers to
(A) an artist (B) a painting (C) a brush stroke (D) a layer of paint

Genetic Engineering is a radical and rapidly developing technology that touches our lives through its application in medicine, forensics, industry and agriculture. Through this science humans are fast becoming the architects of life but there are those who warn against the unknown dangers of playing God while others see its benefits in our fight against disease and the production of **abundant** food supplies.

In the past 50 years, plant and animal production has increased dramatically. Today, the human population is the largest it has ever been and fortunately we produce more food per capita than ever before. Despite the fact that we have enough food for every single human being to have an adequate diet, some 1 billion people still suffer from malnutrition and hunger. A lot of the increase in food

production **is attributed to** efficient farming methods and environmental factors such as irrigation, pest and weed control but the largest contributing factor is modern plant and animal breeding.

Genetically engineered plants and animals have already entered the market and are on our supermarket shelves. Their appearance however has sparked much debate. Scientists have improved plants by changing their genetic makeup through *hybridization* since the 19th century, and farmers have used *crossbreeding* of plants and animals for thousands of years. For example, racehorses are bred to be faster and stronger and roses are bred to produce a wide range of colors. Cattle are bred according to whether they are for beef or dairy herds. Most of today's dairy cattle are very different from the cattle that were originally domesticated. Over the years, dairy herd breeding has focused on increasing milk production and quality. Milk production per cow has doubled in the last 25 years.

So what are GM food and what are the concerns for the consumer? The main difference between GM foods and traditional breeding methods is the direct modification or manipulation of certain genes. Traditional methods involve mixing thousands of genes whereas genetic modification allows just one individual gene, or a small number of genes, to be inserted into a plant, or animal.

The resulting organisms are "genetically modified," "genetically engineered," or "transgenic". The foods that reach the supermarket are known as "GM" foods, *Genetically Modified foods*. The technique allows us to produce plants, animals and microorganisms, such as bacteria, with specific qualities more accurately and efficiently than through traditional methods.

The benefits of GM foods are enormous. Genetic modification can be used to give crops immunity to plant viruses or to improve the nutritional value of a plant. In animals intended for food, genetic modification could potentially increase how fast and how big they grow. *Starvation* on any part of the planer could be a thing of the past as we could the yield, varieties and size of foods and produce strains that are resistant to pests, Extremes in temperature and are tolerant to herbicides.

Opponents of GM foods however consider their production to be the world's biggest uncontrolled biological experiment, a disaster waiting to happen. The biggest concerns are the effects that an uncontrolled genetically modified species could potentially have on human and animal health, agriculture, and on the environment as a whole. Genetically modified species have the potential to become biological pollutants that are far worse than chemical pollutants as they would be virtually impossible to control since they are alive, migrate and could **mutate** producing even more dangerous offspring. This could lead to irreversible damage to the ecology of the planet.

Recent studies have shown that transgenic species could potentially hold bigger surprises than scientists anticipate. Genetically altering plants to resist viruses can cause the virus to mutate into new forms that could potentially be spread. The effect on crops could be disastrous. The toxins released by the genetically mutated virus could also have untold damaging effects on human, animal and plant life. Toxins can produce severe allergic reactions leading to death. (Para 8)

Another example could be the release of larger species into the environment. For example, what if scientists release squid, octopus and salmon that are 3 times their natural size. The new species would eat far more food, leaving less for other species possibly leading to the extinction of several

species that would ultimately damage the delicate ecology of our seas and therefore the planet as whole.

At the moment there is no proof of serious harm to humans, animals and plants but potential for a massive biological disaster that could wreak and irreversible damage is not such a fairy tale. On the other hand the possibility of forever freeing the world of starvation could outweigh ant possible dangers that may or may not be unleashed.

46. What is main difference between GM and traditionally bred foods?
    (A) Scientists can choose the outcome of GM foods such as size and color.
    (B) The consumer if far more concerned about GM foods.
    (C) Traditional methods rely on the direct manipulation of only certain genes.
    (D) The difference lies in the methods and the number of genes that are affected.
47. Why has the appearance of GM foods in the supermarket sparked much debate?
    (A) Some people are worried about man taking over God's role of creator.
    (B) Some people think GM foods should be sent to feed third world countries.
    (C) Some people are concerned about the effects on our health and environment.
    (D) Scientists do not know enough about the harmful effects of certain bacteria
48. In paragraph 6, why does the author state that starvation could be a thing of the past?
    (A) Because all varieties of genetically modified plant or animal will be able to survive in any environment.
    (B) Scientists will be able to raise genetically modified animals on genetically modified animal feed which will dramatically increase their size.
    (C) There would be no need to use expensive herbicides since all genetically modified crops will be pest resistant.
    (D) Scientists will be able to control the size, variety and immunity of crops and animals.
49. In paragraph 7, what is the main opposition to the production of GM foods?
    (A) Chemical pollutants are more dangerous than biological pollutants.
    (B) GM foods are not properly tested.
    (C) Opponents to GM foods say that their production is an agricultural disaster waiting to happen.
    (D) The potential of producing harmful offspring could not be controlled.
50. In paragraph 8, why does the author say that scientists might be surprised?
    (A) Toxins are carried through the air by wind dispersal.
    (B) There is a potential that any new virus strains could be carried to other areas adversely affecting crops, human and animal life.
    (C) They are often surprised by transgenic species.
    (D) Toxins can potentially kill all life forms.

高雄醫學大學 **100** 學年度研究所招生考試試卷

系所: 醫學遺傳學科碩士班
科目: 藥理學

問答題：總分 100 分

1. 請敘述利尿劑的分類、作用部位及臨床用途，並各舉一個藥物說明。(15 分)

2. 請分別各舉一例敘述 steroids 和 NSAID 藥物的作用機轉、臨床用途和副作用。(15 分)

3. 請敘述治療消化性潰瘍 peptic ulcer 的分類、作用機轉及副作用。(15 分)

4. 請敘述降血脂藥物的分類、作用機轉及副作用。(15 分)

5. 請敘述治療憂鬱症狀藥物的分類、作用機轉及副作用。(15 分)

6. 請寫出 oral antidiabetic agents 有哪幾類?並寫出其作用機轉。(15 分)

7. 何謂「標靶療法」？請舉例說明其作用機轉及副作用。(10 分)

高雄醫學大學 100 學年度研究所招生考試試卷 系所: 遺傳學科碩士班
科目: 生物化學

1. 解釋名詞 (每題 4 分，共 20 分)
   (a) Green fluorescence protein
   (b) Urea cycle
   (c) TCA cycle
   (d) Oxidative phosphorylation
   (e) The pentose phosphate pathway

2. 何謂 Prion? 並請說明 Prion 和 Protein misfolding disease 之間的關連性。(10 分)

3. 請說明動物細胞 Membrane phospholipids 的組成，以及 Asymmetry distribution of phospholipids 的生理意義？(10 分)

4. 請舉出 5 種實驗說明如何分析基因 Promoter 區域的 Cis-acting elements 和 Trans-acting elements 的交互作用，並說明每一實驗所能回答之問題為何?(10 分)

5. 請舉出 5 種實驗其分析原理係根據抗體與抗原特異性作用的特性進行，並說明每一實驗所能回答之問題為何？(10 分)

6. 請說明與蛋白質生合成有關的 Non-coding RNA 的種類及其扮演的角色為何？(10 分)

7. 由同一段基因可能產生多種不同的蛋白質，請分別由 Transcription、Translation 及 Post-translation 分別探討其機制。(10 分)

8. 請比較 Hemoglobin 及 Myoglobin 結構上的不同點，及此結構差異對 Hemoglobin 及 Myoglobin 生理功能的影響。(10 分)

9. 請說明 Two-dimensional electrophoresis 及質譜分析在蛋白質體實驗的角色為何？以及如何利用蛋白質體方法找尋與疾病相關的 Biomarkers。(10 分)

高雄醫學大學 100 學年度研究所招生考試試卷　系所: 醫學系醫學遺傳學科碩士班
科目: 分子生物學

選擇題 40%

1. There are two strands of DNA which have exactly the same length. The first one has a very high G + C/A + T ratio of 3.6. The second DNA strand has a more moderate G + C/A + T ratio of 2.0. Which of the two strands will have the highest melting temperature and why?
(a) the first strand because it contains more H bonds
(b) the second strand because it contains more H bonds
(c) the first strand because it contains fewer H bonds
(d) the second strand because it contains fewer H bonds
(e) neither since their melting temperatures are the same

2. What is the name of the site where RNA polymerase binds to the DNA prior to the beginning of transcription?
(a) the operator
(b) the terminator
(c) the promoter
(d) the repressor
(e) the structural genes

3. The 3' end of most eukaryotic mRNAs contains a _____, while the 5' end has a _____.
(a) poly(A) tail, methylated guanosine cap
(b) poly(U) tail, methylated guanosine cap
(c) methylated guanosine cap, poly(A) tail
(d) poly(A) tail, sulfonated guanosine cap
(e) methylated guanosine cap, poly(U) tail

4. Which nucleotides have the greatest similarities among codons specifying the same amino acid?
(a) in the first two nucleotides of the triplet
(b) in the last two nucleotides of the triplet
(c) in the first and third nucleotides of the triplet
(d) in the third nucleotide of the triplet
(e) in the middle nucleotide of the triplet

5. What enzyme is required for movement of transposable elements that involve an RNA intermediate?
(a) RNA polymerase
(b) DNA polymerase
(c) reverse transcriptase
(d) polyA polymerase
(e) peptidyltransferase

6. What happens if the gene for one of the snoRNAs is deleted?

(a) Nothing happens

(b) An extra pre-rRNA nucleotide is modified.

(c) One pre-rRNA nucleotide (the corresponding one) is not modified enzymatically as it normally is.

(d) None of the ribose moieties are methylated.

(e) None of the nucleotides are pseudouridylated.

7. How do exon-junction complexes mark messages as having a nonsense mutation?

(a) After the initial translation, EJCs should be removed if translation of the whole mRNA has occurred.

(b) EJCs bind tightly to nonsense mutations.

(c) EJCs fall off of a messenger if a nonsense mutation is present.

(d) EJCs bind to the gene itself only if a nonsense mutation is present.

(e) EJCs do not bind to nonsense mutations.

8. Which enzyme, also responsible for siRNA formation, carves miRNAs from their double-stranded, fold-back RNA precursor (pre-miRNA)?

(a) riboendonuclease

(b) Dicer ribonuclease

(c) deoxyribonuclease

(d) RNA helicase

(e) reverse transcriptase

9. What are sites in the genome that vary among different individuals and they usually refers to a genetic variant that occurs in at least 1% of a species population.

(a) Genetic variances

(b) Genetic anomalies

(c) Genetic polymorphisms

(d) Genetic polyploidisms

(e) Genetic polydactyly

10. What may serve as the epigenetic mechanism by which inactive euchromatic regions are perpetuated in daughter cells?

(a) phosphorylated histone H2A tails

(b) acetylated histone H2A tails

(c) acetylated histone H3 tails

(d) acetylated H4 tails

(e) methylated modified DNA

11. What is defined as the complete collection of proteins present in a particular cell type?

(a) proteome

(b) repressome

(c) transcriptome

(d) translatome
(e) replicon
12. What enzyme is responsible for maintaining the length of the DNA sequences on the ends of chromosomes?
(a) DNA polymerase
(b) telomerase
(c) telomere synthase
(d) telomere disruptase
(e) telomere phosphodiesterase
13. What do all of the environmental agents that can cause cancer have in common?
(a) They can all alter the genome
(b) They are all soluble in water
(c) They are all made of nucleic acids
(d) They are all made of amino acids
(e) They all can alter proteins present in the cell cytoplasm that are responsible for the onset of cancer
14. Which antibodies are the first to be secreted by B cells after antigen stimulation? They appear in the blood after a lag of a few days and have a relatively short half-life?
(a) IgD
(b) IgA
(c) IgM
(d) IgK
15. Which genes are most strongly linked to increased susceptibility to autoimmune diseases?
(a) genes encoding MHC class I polypeptides
(b) genes encoding MHC class II polypeptides
(c) genes encoding Ras polypeptides
(d) genes encoding glucocorticoid receptors
(e) genes encoding microglobulin
16. What method can be used to functionally inactivate a gene without altering its sequence?
(a) gene knockout
(b) RNA interference
(c) dominant negative mutation
(d) b and c
(e) all of the above
17. Indicate the order in which the following steps occur in the production of a mature mRNA.
(a) initiation of transcription, splicing, addition of 5′' cap, addition of poly(A) tail, transport to cytoplasm
(b) initiation of transcription, addition of 5′ cap, splicing, addition of poly(A) tail, transport to cytoplasm

(c) initiation of transcription, addition of poly(A) tail, addition of 5′ cap, splicing, transport to cytoplasm
(d) initiation of transcription, addition of 5′ cap, addition of poly(A) tail, splicing, transport to cytoplasm

18. Transcriptionally inactive genes
(a) are always located within euchromatin.
(b) are not located within nucleosomes.
(c) often are methylated.
(d) are not resistant to DNase I.

19. microRNAs play a key role in which of the following?
(a) translational repression
(b) viral RNA degradation
(c) RNA interference
(d) all of the above

20. Autoimmune diseases are associated with particular alleles of genes for
(a) cytokines.
(b) immunoglobulins.
(c) MHC proteins.
(d) T cell receptors.

配合題 30%

專有名詞	簡易名詞解釋
1. Clone	A. The formation of a phosphodiester bond to link two adjacent bases separated by a nick in one strand of a double helix of DNA.
2. Enhancer	B. A group of closely related immunoglobulin chains.
3. Epigenetic	C. A large number of cells or molecules identical with a single ancestral cell or molecule.
4. Exon	D. A macromolecular complex containing a variety of proteins and a number of distinct ribonucleoprotein particles that functions in removal of introns from a primary transcript.
5. Hairpin	E. The any segment of an interrupted gene that is represented in the mature RNA product.
6. Inducer	F. A cis-acting sequence that increases the utilization of eukaryotic promoters, and can function in either orientation and in any location relative to the promoter.
7. Intron	G. The short stretches of 1000~2000 bases produced during discontinuous replication in prokaryotes.
8. Isotype	H. A segment of DNA that transcribed, but removed from within the transcript by splicing together the sequences on either side of it.
9. Ligation	I. A sequence of DNA at which replication is initiated.
10. Spliceosome	J. A change influences the phenotype without altering the genotype.
11. Okazaki fragments	K. A DNA substance included in the cytoplasm of bacteria.
12. Origin	L. A double-helical region formed by base pairing between adjacent complementary sequences in an single strand of DNA or RNA.
13. Plasmid	M. A region of DNA involved in binding of RNA polymerase to initiate transcription.
14. Promoter	N. A small molecule that triggers gene transcription by binding to a regulator protein.
15. TATA box	O. A DNA sequence (cis-regulatory element) found in the promoter region of genes in archaea and eukaryotes.

問答題 30%

1. Please list 3 elements of plasmid and explain their functions. (10%)
2. Please descript the principle of Real-Time quantitative PCR (qPCR). (20%)