

國立中正大學101學年度學士班二年級轉學生招生考試試題

數學系、地球與環境科學系、物理學系

學系別：資訊工程學系、電機工程學系、機械工程學系 科目：微積分
化學工程學系

第 1 節

第 1 頁，共 2 頁

一、 填空题(每個空格 7 分, 共 56 分)

1. If $f(x) = \exp(g(x))$, where $g(x) = \int_0^{\sin(\pi x)} \sqrt{1+t^2} dt$, find $f'(1)$. (a)
2. Find the interval of convergence of the series $\sum_{n=0}^{\infty} \frac{(x-3)^n}{n^2-1}$. (b)
3. For what value of C does the equation $\ln x = Cx^3$ have exactly one solution? (c)
4. Find the linearization $L(x, y) = Ax + By + C$ of the function $f(x, y) = x\sqrt{y}$ at the point $(-5, 4)$. (d)
5. Find the arc length of the curve $y = \frac{x^2}{2}$, $x \in [0, 1]$. (e)
6. The base of a solid is the ellipse $x^2 + 4y^2 = 4$, and every parallel cross sections perpendicular to the x -axis are equilateral triangles (等邊三角形). Find the volume of the solid. (f)
7. Find the area of the region enclosed by the curve $r^2 = 4 \sin 2\theta$. (g)

8. Let S be the surface of the solid E that lies above the cone $z = \sqrt{x^2 + y^2}$ and below the sphere $x^2 + y^2 + z^2 = z$ and $\mathbf{F}(x, y, z) = (z, y, \sin(x + y))$. Evaluate $\iint_S \mathbf{F} \cdot d\mathbf{S} =$ (h)

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第 2 頁，共 2 頁

二、計算題(44分，這部分必須有完整計算過程，僅有答案而沒有計算過程得0分)

1. (4+4+4=12分) Sketch the solid whose volume is given by $\int_0^1 \int_0^{\sqrt{1-z}} \int_0^{1-x} f(x, y, z) dy dz dx$.
Then, rewrite this iterated integral in the following orders:

(a) $\iiint f(x, y, z) dx dz dy$ (b) $\iiint f(x, y, z) dy dz dx$

2. (5+5=10分) Please complete the following steps to compute the improper integral $\int_0^{\infty} e^{-x^2} dx$:

(a) First of all, compute the double integral $\iint_{R^2} e^{-x^2-y^2} dA$

(b) Apply Fubini's theorem and symmetric property of the function e^{-x^2} to find the integral $\int_0^{\infty} e^{-x^2} dx$.

3. (4+2+6=12分) (a) Derive the formula: $\int_0^1 x^n (\ln x)^k dx = \frac{-k}{n+1} \int_0^1 x^n (\ln x)^{k-1} dx$

(b) Derive the formula $\int_0^1 x^n (\ln x)^n dx = \frac{(-1)^n n!}{(n+1)^{n+1}}$

(c) Use the formula $x^x = e^{x \ln x}$ and the Maclaurin series for e^x to derive the formula

$$\int_0^1 x^x dx = \sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n^n}$$

4. (10分) Let $f(x, y) = 8xy - 2x - 4y + 5$. Find the absolute minimum value of the function $f(x, y)$ on the set D , where D is the region bounded by the parabola $y = x^2$ and the line $y = 4$.

1. (3%) Explain the major difference between compiler and interpreter.
2. (4%) Give one example of programming languages based on compiler and another example based on interpreter.
3. (3%) What is inline function in C?
4. (4%) Explain the difference between call by value and call by reference.
5. (12%) Write down the outputted values of a1, a2, a3, and a4 of the following C code.

```
#include <stdio.h>
#include <stdlib.h>
int test(int *number);
int main()
{   int i=0, a1=0, a2=1, a3=2, a4=3;
    for(a1=0;a1<=10;a1++);
        a1++;
    for( i<5;i++)
        a2+=i;
    a4=test(&a3);
    printf("%d,%d,%d,%d",a1,a2,a3,a4); //Output
    return 0;
}
int test(int *number)
{   int a3;
    *number=10;
    a3=20;
    return a3;
}
```

6. (24%) Write down the outputted values of A, B, C, D, E, F, G, H of the following C code.

```
int main(){
    int s[5]={1,2,3,4,5};
    int *p, *ptr=s+2;
    p=s;
    printf("A:%d\n", *p++);
    printf("B:%d\n", (*p)++);
    printf("C:%d\n", ++*p);
    printf("D:%d\n", **++p);
    printf("E:%d\n", *(s+4));
    printf("F:%d\n", ptr[0]);
    printf("G:%d\n", **++ptr);
    printf("H:%d\n", *(ptr+1));
    return 0;
}
```

7. (12%) A company released two versions of a new mobile phone last month. One uses an older version application processor S3 running at 1.7GHz, while the other uses newer S4 @ 1.5GHz. Both application processors (S3 & S4) have two cores implementing ARM V7 ISA (instruction set architecture). However, the test report from the mobile01 website (www.mobile01.com) indicates that the latter (S4 with a slower operating frequency @ 1.5GHz) has better performance. Please list at least three possible reasons.

8. (18%) The following is an abridged specification of the S3 application processor.

CPU	Dual-core Scorpion CPUs up to 1.5GHz per core
GPU	Adreno™ 220 Graphics with support for Flash 10 and WebGL
Memory	333MHz ISM/266MHz LPDDR2
Video	HD1080p video playback and streaming
Camera	16-megapixel; dual camera support; stereoscopic 3D capture, playback and output up to 1080p
LCD	Support Up to WSXGA (1440x900)
USB	USB 2.0 High Speed OTG (480Mbps)

- (a) Please explain the following terms briefly: **Flash 10**, **LPDDR2**, **HD1080p**, and **pixel** respectively.
(b) What is the minimum bandwidth requirement to support the WSXGA LCD?
(c) How long does it need at least to transfer a 4.3GB movie via the USB 2.0?

9. (20%) Multiplication of two unsigned binary numbers can be simply carried out in a similar way of decimal multiplication taught in the elementary school. The following is an illustrating example which performs 0101_2 (5) \times 1010_2 (10) = 110010_2 (50). Please describe a method to perform multiplication on two signed numbers 0101_2 , \times 1010_2 (both represented in 2's complement).

$$\begin{array}{r} 0101 \quad (5) \\ \times 1010 \quad (10) \\ \hline 0000 \\ 01001 \\ 00000 \\ \hline 110010 \quad (50) \end{array}$$

作答說明

1. 本測驗共 2 大部份，共 50 題，每題 2 分。
2. 請將答案填寫在答案卷上，未依規定填寫在答案卷上，一律不計分。
3. 測驗完成後，答案卷需連回題目卷一併繳交。

Part 1: Cloze (50%, 每題 2 分)

作答說明：選擇最適當的一個字詞填入空格。每題僅有一個選項最適合。

Smartphones and tablet computers are expanding the market for handheld video games and challenging traditional devices, forcing game developers to (1) _____ to a rapidly changing landscape. The new market includes not only die-hard gamers but more casual players, the kind who tap the touch screens of their iPhones or Android devices while (2) _____ the train or waiting for the dentist. Mobile gaming is a unique market, (3) _____ games that are either free — financed by advertising — or costing just a few dollars. This represents a change for classic developers, which (4) _____ millions of dollars in major franchises and sell games for around US\$60 apiece. Eiji Araki, whose company has seen rapid growth in recent years, said the mobile space is special: "The games are getting simpler and easier (5) _____ the casual audience grows."

1. (A) adapt (B) attach (C) conform (D) reply
2. (A) driving (B) riding (C) moving (D) changing
3. (A) of (B) about (C) with (D) for
4. (A) devote (B) finance (C) spend (D) invest
5. (A) for (B) then (C) as (D) to

How something is made, where a product comes from and whether it is good or the environment and ourselves are no longer issues just for the food we eat. The fashion word is asking the same questions, hoping that our (6) _____ extend to the clothing we wear. In eco-conscious London, "upcycling" was the buzzword during fashion week last month. In Detroit, designers are taking it a(n) (7) _____ further by making clothing that will benefit some of the city's more than 20,000 homeless people. Veronika Scott then created an insulated coat for the homeless (8) _____ could double as a sleeping bag while outside. Clothing is transforming (9) _____ something more than just a fashion statement, one that's environmentally and socially (10) _____, too.

6. (A) leaders (B) processes (C) concerns (D) movements
7. (A) mile (B) step (C) action (D) option
8. (A) that (B) in which (C) who (D) with whom
9. (A) by (B) through (C) with (D) into
10. (A) authentic (B) responsible (C) realistic (D) acceptable

Coffee, the wonderfully aromatic channel for the world's most popular drug -- caffeine -- began its spread from Ethiopia in the 15th Century and never stopped. Providing the Arab world with an alternative to alcohol, it gave (11) _____ to a coffeehouse culture that revolved around stimulating intellectual conversation and the (12) _____ of new ideas. Today, coffee is enjoyed all over the world. Coffee is (13) _____ by roasting the beans of a coffee plant, grinding them and brewing the resulting grounds using a number of methods. In Turkey, coffee is brewed by boiling finely ground coffee in a copper pot, while in Italy, espresso is "pressure-brewed" (14) _____ about 30 seconds. Japan has become famous for its iced coffee, (15) _____ is made by brewing hot coffee and instantly chilling it.

11. (A) rise (B) growth (C) progress (D) movement
12. (A) change (B) respect (C) response (D) exchange
13. (A) formed (B) made (C) developed (D) established
14. (A) to (B) with (C) in (D) at
15. (A) by which (B) in which (C) that (D) which

Plane food has come a long way since British Airways served beef, tea and sandwiches 85 years ago. Providing quality meals (16) _____ an altitude of 35,000ft is the main challenge to ensure that meals are (17) _____ to the same standards that the celebrity chef would expect in their own restaurants. Dehydration and cabin air-conditioning suck out much of food's (18) _____. Besides, most of the food has to be pre-cooked in industrial kitchens before the flight, then chilled to keep the quality. Top chefs have suggested that airlines can increase their use of umami, (19) _____ is one of the five basic tastes discovered by the Japanese. This flavor does not (20) _____ in the dry cabin atmosphere. Umami-rich ingredients also help reduce the traditionally high salt and sugar content of airplane meals.

16. (A) with (B) to (C) at (D) on
17. (A) cooked (B) served (C) attended (D) made

- | | | | |
|------------------|-----------------|----------------|-----------|
| 18. (A) appetite | (B) inspiration | (C) flavor | (D) sense |
| 19. (A) which | (B) who | (C) with which | (D) that |
| 20. (A) shrink | (B) diminish | (C) weaken | (D) fail |

Hot spring bathing as a form of medical treatment, is widely practiced in Japan. Although generally considered an "alternative medicine", its (21) _____ have been demonstrated by global medical studies and it has been used to treat skin conditions. Hot spring bathing is an important part of Japanese culture, and (22) _____ is well-established. The following tips should help you through your first experience. First, (23) _____ off before going in. Bring your own soap, shampoo and towel just in case. Second, be sure not to let your towel fall into the bath, since the goal is the keep the water as clean as possible. Third, there are (24) _____ baths for men and women. Fourth, do not take pictures. Fifth, drink water, but not alcoholic beverages because long exposure (25) _____ hot water can be dangerous if you are drunk.

- | | | | |
|--------------------|--------------|------------------|--------------|
| 21. (A) expansions | (B) benefits | (C) improvements | (D) gains |
| 22. (A) etiquette | (B) contract | (C) transaction | (D) bond |
| 23. (A) soak | (B) spray | (C) rinse | (D) shower |
| 24. (A) remote | (B) separate | (C) isolated | (D) attached |
| 25. (A) for | (B) of | (C) to | (D) with |

Part 2: Vocabulary: Choose the best definition for the underlined word(s) in each sentence (50%, 每題 2 分)

作答說明：每一個句子皆有一個劃底線字詞，選擇最適合該字詞意義的一個選項。

26. Business and first class account for about a third of all airline seats but generate a majority of the revenue.
 (A) path (B) avenue (C) income (D) opportunity
27. Traditionally, the Euros have provided a platform for some of European football's youngest and brightest stars to shine.
 (A) level (B) stage (C) phase (D) proposal
28. It takes huge amounts of passion, patience, dedication and determination to bring these much-loved images to the audience.
 (A) admission (B) promise (C) deduction (D) commitment
29. Facebook has suffered a series of service disorders which left many people unable to use the social network.
 (A) troubles (B) interventions (C) intervals (D) explosions
30. If you like taking notes on your laptop, keep in mind that it can be a barrier between you and others, because the screen often blocks part of the other person's body or face.
 (A) limit (B) border (C) block (D) firewall
31. People know that procrastination hurts themselves, others and their work, so why do they do it? One answer is that they are overwhelmed.
 (A) interval (B) interruption (C) delay (D) pause
32. Bus drivers are going on strike, which will affect 12,000 people. The refusal to work begins on Thursday night and will continue throughout the day on Friday.
 (A) consent (B) reception (C) rejection (D) selection
33. Smart devices strain the eyes in a different way. There is harm in reading personal e-mail messages or text messages on portable devices while in the office and among co-workers.
 (A) insecure (B) convenient (C) vulnerable (D) mobile
34. Regular air travel might be viewed as one huge headache, so the growing availability of massage in airports is not surprising.
 (A) profit (B) plan (C) convenience (D) improvement
35. If you are in a meeting, take only urgent calls. Let others know that you're expecting the call, set your phone to the vibrate mode and leave the room to answer it.
 (A) important (B) chargeable (C) dangerous (D) responsible
36. Health research shows that a higher frequency of short breaks can be more beneficial than just one long break.
 (A) valuable (B) profitable (C) helpful (D) commercial
37. Creating a healthy work environment can lead to better product quality, higher levels of productivity, and better customer service ratings.
 (A) proficiency (B) efficiency (C) expertise (D) ability

國立中正大學101學年度學士班二年級轉學生招生考試試題

共同科目：英文

第 3 節

第 7 頁，共 7 頁

38. The Internet has allowed readers to enjoy a more intimate relationship with their favorite authors, whom they now expect to be accessible online via blogs, Twitter and Facebook.
(A) reachable (B) entered (C) widespread (D) extensive
39. Since the recession, companies are asking their workers to be more innovative, creative, and efficient.
(A) artistic (B) inventive (C) practical (D) capable
40. Smartphones and tablets are a new presence in meeting rooms, and unlike laptops, they are usually associated with games, texting and other non-work activities.
(A) existence (B) gift (C) talent (D) cycle
41. Common concerns about keeping a city up all night relate to noise, traffic and alcohol consumption.
(A) discontinuing (B) serving (C) wasting (D) drinking
42. In Washington DC, where city officials are debating the advantages of extending late-night hours, some residents oppose the idea as it will also lead to an increase in crime.
(A) meet (B) enter (C) race (D) disagree
43. The key issue is to get more people living in town and city centers in good quality accommodation, because it can support another kind of economy.
(A) housing (B) cabin (C) praise (D) admiration
44. The house has been deserted; nobody lives there anymore.
(A) cleaned (B) forsaken (C) ruined (D) broken
45. The life of many Japanese people became chaotic after the terrible tsunami.
(A) unsatisfied (B) disorganized (C) threatening (D) despairing
46. I have to put off the trip to Brazil due to bad weather.
(A) schedule (B) arrange (C) postpone (D) cancel
47. Hold on a moment, please. I'll transfer your call to Mr. Louis.
(A) change (B) pass (C) submit (D) share
48. She declined our invitation because she had to attend the open ceremony of the cinema.
(A) accepted (B) considered (C) rejected (D) reverted
49. TV commercials have a great impact on especially pre-teens.
(A) existence (B) explosion (C) influence (D) infection
50. With innovations in technology, the world is constantly changing.
(A) always (B) sometimes (C) gradually (D) frequently

一、選擇題：(請為各題選出最適當的答案)(15%)

1. 下面哪一個選項完全沒有錯字？(a) 立立在目，(b) 床第之間，(c) 撒手人寰，(d) 卓爾不群。
2. 宋之問〈渡漢江〉：「嶺外音書斷，經冬復歷春。_____，不敢問來人」。根據上下句詩意，第三句空白處應填入：(a) 近鄉情更怯，(b) 相逢無紙筆，(c) 昔時人已沒，(d) 海內存知已。
3. 李後主被譽為詞中之帝，亡國之後，他的詞作風格從原本的綺麗婉約轉為悲壯淒厲。請問下列詞句何者應該作於「亡國之前」？(a) 林花謝了春紅，太匆匆。無奈朝來寒雨晚來風。(b) 歸時休放燭花紅，待踏馬蹄清月夜。(c) 春花秋月何時了，往事知多少。(d) 夢裏不知身是客，一晌貪歡。
4. 張璠、柳夢梅、許仙、李益都是中國才子佳人故事中著名的男主角，與他們相對應的女主角依序應該是：(a) 「杜麗娘、崔鶯鶯、霍小玉、白素貞」，(b) 「霍小玉、杜麗娘、白素貞、崔鶯鶯」，(c) 「崔鶯鶯、杜麗娘、白素貞、霍小玉」，(d) 「崔鶯鶯、霍小玉、白素貞、杜麗娘」。
5. 「海線是條叫人分心的路徑，這些多皺蒼鬱的山巒、淡紫濃金蒸騰的霧靄、遼遠而閉闊的海洋、彎月型的岬灣、嶙峋深沈的岩岸，這些都讓人一再、一再地耽溺，頻頻回顧，時時停頓」，接下來收束此段的文字應該是：(a) 這片土地，就這樣黯淡了下去。(b) 因此沒有誰能準確知道這段旅途需要多少時間。(c) 它確實是沿著山海之間的一線海灘而行，一路上都看得見海的線條。(d) 從前這些海岸四處可見前哨濱海植物，林投樹、草海桐、馬鞍藤和文珠蘭，風景空闊疏美。

二、以下劃上底線的詩句，運用了何種修辭技巧？(請就下列選項，為各題選出最適當的答案)(15%)

1. 獨在異鄉為異客，每逢佳節倍思親。遙知兄弟登高處，遍插茱萸少一人。(王維〈九月九日憶山東兄弟〉)
2. 戍鼓斷人行，邊秋一雁聲。露從今夜白，月是故鄉明。(杜甫〈月夜憶舍弟〉)
3. 那河畔的金柳，是夕陽中的新娘。波光裡的豔影，在我的心頭蕩漾。(徐志摩〈再別康橋〉)
4. 我達達的馬蹄是美麗的錯誤，我不是歸人，是個過客。(鄭愁予〈錯誤〉)
5. 我的怒中有燧人氏，淚中有大禹。(余光中〈五陵少年〉)

- (A) 擬人 (B) 借代 (C) 鑲嵌 (D) 譬喻 (E) 倒裝
(F) 誇飾 (G) 層遞 (H) 映襯 (I) 類疊 (J) 示現

國立中正大學101學年度學士班二年級轉學生招生考試試題

共同科目：國文

第4節

第 2 頁，共 2 頁

三、閱讀測驗：(30%)

我喜歡中國人的除夕。年事增長，再到除夕，彷彿又回到了那領壓歲錢的歡欣。我至今仍喜歡「壓歲錢」這三個字，那樣粗鄙直接，卻說盡了對歲月的惶恐、珍重，和一點點的撒賴與賄賂。而這些，封存在簇新的紅紙袋中，遞傳到孩童子姪們的手上，那抽象無情的時間也彷彿有了可以寄托的身分，有許多期許，有許多願望。(蔣勳〈無關歲月〉)

(一)、為什麼作者會認為「壓歲錢」三字，雖粗鄙直接，卻說盡了對歲月的惶恐與珍重？

(二)、作者認為簇新的紅紙袋可以給抽象無情的時間留下何種意義？

三、作文：(40%)

有人說：「說出來會被嘲笑夢想才有實踐的價值」，然而忽略客觀條件的限制卻很可能成為一個好高騖遠、不切實際的空想家。你是如何定義「夢想」？又是如何看待追求夢想的路上會遇到的挫折？請以「夢想」為題，並用他人或自身的實例，寫作一文說明你的看法，文章必須分段，抒情論述不拘。