

# 國立中山大學 102 學年度碩士暨碩士專班招生考試試題

科目名稱：計算機概論【資管系碩士班甲組、丙組】

題號：442001

※本科目依簡章規定「不可以」使用計算機

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(A) 共 16 題：1~14 單選題，15~16 複選題。每題 5 分。

- Which of the following statements is true?
  - Increasing degree of multiprogramming may result in thrashing.
  - Caching can solve thrashing problem.
  - Demand paging is suitable for loading operating system kernel.
  - Segmentation memory access scheme has the same segmentation problem as paging.
  - None of the above.
- Which of the following statements about networking is **NOT** true?
  - A sender in data link layer does not need to know the receiver's address.
  - There is no routing path concept in data link layer.
  - ARP is used to resolve the mapping from IP address to its MAC address.
  - DNS is used to resolve the mapping between IP address and domain name.
  - None of the above is true.
- Which of the following statements about object oriented programming is **NOT** true?
  - Polymorphism allows an object to be accessed in more than one data type.
  - Encapsulation can be used to ensure that sensitive data can only be changed within the scope of the class itself.
  - Overriding a method redefines the method with the same return type and parameters.
  - Inheritance reduces code development effort.
  - None of the above is true.
- Which of the following statements about recursion is **NOT** true?
  - A recursive program contains a segment of code for base case(s) and that for recursive case(s).
  - Recursive program often generates shorter program than the iterative version.
  - Recursion looks backward through convergence on a base case.
  - Recursion makes the program execution efficiently.
- Which of the following statements about binary tree is **NOT** true?
  - The maximum number of nodes on level  $k$  is  $2^{k-1}$ , given that root is at level 1.
  - A complete binary tree with  $n$  nodes has the height of at most  $\log n$ .
  - Traversal of a binary tree with  $n$  nodes has the time complexity of  $O(n \log n)$ .
  - The maximum number of nodes in a binary tree of level  $k$  is  $2^k - 1$ .
  - The height of a tree is a height of the root.
- Which of the following statements about network is true?
  - The subnet mask is 255.255.240.0 for a Class B to have 32 subnets.
  - The subnet mask of 255.255.255.224 partitions a Class C network into 8 subnets.
  - The maximum number of subnets for a Class B network is 256.
  - None of the above.
- The postfix expression of  $A+(B-C)*D-E$  is
  - ABC-D\*+E-
  - ABC-+D\*E-
  - +A\*-BCDE
  - ABCD\*-+E-

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8. When planning database design, the process of minimizing data redundancy to reduce the possibility of update anomalies is called
  - (A) Atomicity
  - (B) Normalization
  - (C) Indexing
  - (D) Concurrency control
9. The class of problems known as NP-hard is so named because it is composed of which of the following?
  - (A) Non-deterministic polynomial problems
  - (B) Non-polynomial problems
  - (C) Non-programmable problems
  - (D) Non-universal problems
10. Which of the following approaches in processor architectures highly depends on the compiler optimization of code generation to exploit instruction level parallelism?
  - (A) out-of-order execution
  - (B) very long instruction word
  - (C) superscalar
  - (D) pipelining
11. Which one of the following is not a wireless wide area network technology?
  - (A) UMTS
  - (B) LTE
  - (C) WiMAX
  - (D) Ultra-wideband
12. Which of the following features of C++ will perform machine-code level operations?
  - (A) function
  - (B) class
  - (C) run-time type identification
  - (D) pointer
13. Normally, a “64-bit” computer means the size of which one is 64-bit?
  - (A) hard-disk
  - (B) register
  - (C) color depth
  - (D) DRAM bandwidth
14. Which of the following data structures is suitable for handling recursive calls?
  - (A) Hash
  - (B) Set
  - (C) Queue
  - (D) Stack
15. (複選) Which of the following could be possible time complexity of the quick sort algorithm?
  - (A)  $\theta(n \log n)$
  - (B)  $\theta(n)$
  - (C)  $\theta(n^2)$
  - (D)  $\theta(\log n)$

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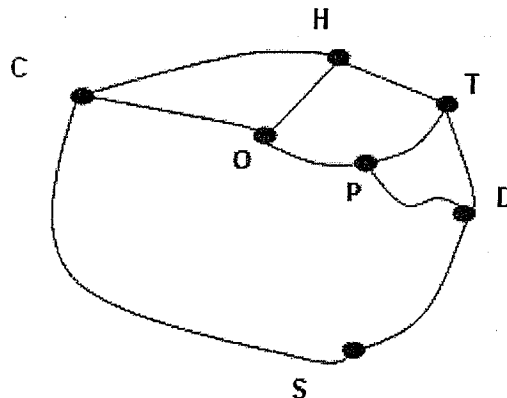
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16. (複選) Which of the following are found paths of breath-first search?  
(A) HOC (B) HCS (C) TDP (D) THO



## (B) 問答題

1. (10%) Given the program below. (A) What is the output of 407? (B) Please explain what the program does.

```
#include <stdio.h>
main()
{
    int number, sum = 0, temp, remainder;
    printf("Enter a number\n");
    scanf("%d",&number);
    temp = number;
    while( temp != 0 )
    {
        remainder = temp%10;
        sum = sum + remainder*remainder*remainder;
        temp = temp/10;
    }
    if ( number == sum )
        printf("Is an armstrong number.");
    else
        printf("Is not an armstrong number.");
}
```

2. (5%) Is Java a compiled or interpreted language? Explain your answer.
3. (5%) In C programming language, given a variable  $a=3$ , what is the value of the evaluation  $a++a$ ? Explain.



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科目名稱：統計學【資管系碩士班乙組】

題號：442002

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全部計算題，共 100 分。

- (每小題 5 分) An oil company is considering a prospect field for exploration. According to a geological assessment, there is a 20% chance that the field will produce oil. Further, there is an 75% that a particular well will strike oil given that oil is present in the prospect field.
  - What extra information should we obtain to determine the probability that the prospect field will produce oil given the result of a drilled well?
  - What are the reasonable assumptions about the extra information?
  - Argue that based on the assumption in (2), if one well is drilled on the field and strikes oil, then oil is present in the prospect field definitely.
  - Suppose that one well is drilled and it comes up dry. Another well on the field is then drilled and comes up dry too. What is the probability that the prospect field will produce oil? Assume that the results of these two drills are independent no matter the prospect field contains oil or not.
- (每小題 5 分) Suppose that you roll a biased four-sided die that numbers from 1 to 4. The probability of a number shown is proportional to the number itself.
  - Plot the probability distribution for the number shown after rolling. Compute the mean and the standard deviation of this distribution.
  - Assume that you roll the die twice (sample size  $n=2$ ) to get a sample. List all possible such samples along with their associated probabilities.
  - Find the possible values for the sample mean along with their associated probabilities.
  - Plot the sampling distribution of the sample mean. Compute the mean and the standard deviation of this distribution.
  - Compare the results of (1) and (4). With regard to the means of both distributions, what property do you observe? Which distribution has larger variance? How are their variances related?
- (每小題 5 分) An investigation of ethnic differences in reports of pain perception was presented. A sample of 50 blacks and 160 whites participated in the study. Subjects rate (on a 13-point scale) the intensity and unpleasantness of pain felt when a bag of ice was placed on their foreheads for two minutes. The mean pain intensity for blacks was 8.0 and for whites, 6.8.
  - Why is it dangerous to draw a statistical inference given the above information only?
  - Give possible value of the missing sample standard deviation that would lead you to conclude (at  $\alpha = 0.05$ ) that blacks, on average, can stand for a pain intensity rating more than 7.5.
  - What assumption(s) do you need to perform test in (2)?
  - Give possible values of the missing sample standard deviations that would lead you to an inconclusive decision (at  $\alpha = 0.05$ ) regarding whether blacks or whites have a higher mean intensity rating.
- (每小題 7 分) For each of the following hypothesis tests, identify what are the hypotheses, what kind of test can be used, what is the test statistic in the function form of the sample, what is the rejection region with appropriate degrees of freedom, and the assumptions behind each test.
  - A pet food company is desired to know which product line, kidney- or shrimp-based cat foods, is of better quality. An experiment is conducted to compare the two products with a sample of 20 cats selected from the population at a local animal shelter. Ten cats were randomly assigned to each of the products being tested. Each of the cats was presented with 3 ounces of the selected food in a dish at feeding time. The researchers defined the variable to be measured as the number of ounces of food consumed within a 10-minute time interval right after the filled dish was presented.

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- (2) Shipments of meat, meat by-products, and other ingredients are mixed together in several filling lines at a pet food canning factory. Operations manager suspect that although the mean amount filled per can of pet food is usually stable, the variability of the cans filled in line A is greater than that of line B. A random sample of 10 8-ounce cans from line A and 12 8-ounce cans from line B is collected accordingly.
- (3) A bank branch located in a commercial district of a city had the business objective of improving the process for serving customers during the noon-to-1:00 P.M. lunch period. To do so, the waiting time (defined as the time the customer enters the line until he or she reaches the teller window) needs to be shortened to increase customer satisfaction. The previous standard waiting time is 5 minutes. A random sample of 15 customers during this hour is recorded over a period of a week.
- (4) An important quality characteristic used by the manufacturer of Boston asphalt shingles is the amount of moisture the shingles contain when they are packaged. Customers may feel that they have purchased a product lacking in quality if they find moisture and wet shingles inside the packaging. To monitor the amount of moisture present, the company conducts tests to measure the pounds of moisture per 100 square feet. It is desired that the mean moisture content is less than 0.35 pound per 100 square feet. A random sample of 36 measurements is recorded.
- (5) Nine experts rated four brands of Colombian coffee in a taste-testing experiment. A rating on a 7-point scale (1 = extremely unpleasing, 7 = extremely pleasing) is given for each of four characteristics: taste, aroma, richness, and acidity, and the summated rating, accumulated over all four characteristics represent the quality of a certain brand of Colombian coffee.

# 國立中山大學 102 學年度碩士暨碩士專班招生考試試題

科目名稱：資料結構【資管系碩士班丙組】

題號：442003

※本科目依簡章規定「不可以」使用計算機

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## A. Multiple choices: 10 questions, 5% each

1. Here is the code for an integer variable n:

```
while (n > 0)
{
    n = n/10; // Use integer division
}
```

What is the worst-case time analysis for the above loop?

- A.  $O(1)$
  - B.  $O(\log n)$
  - C.  $O(n)$
  - D.  $O(n^2)$
2. Is it possible for a method of a class to activate another method of the same class?
- A. No.
  - B. Yes, but only public methods.
  - C. Yes, but only private methods.
  - D. Yes, both public and private methods can be activated within another method.
3. Given the method implementation using the Location type as follows:

```
public static void f(int i, Location k)
{
    i += 1;
    k.shift(2, 0);
}
```

Suppose that a main program has an integer variable m (equal to zero), and a Location object n (with n.getX() equal to zero). Then the main program calls f(m,n); What are the values of m and n.getX() after the method f finishes?

- A. Both m and n.getX() are still 0.
  - B. m is now 1, but n.getX() is still 0.
  - C. m is still 0, but n.getX() is now 2.
  - D. m is now 1, and n.getX() is now 2.
4. Given the method implementation as follows:

```
public static foo(int[ ] b)
{
    b[0]++;
}
```

What is printed by these statements?

```
int[ ] x = new int[100];
x[0] = 2;
foo(x);
System.out.println(x[0]);
```

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A. 0

B. 1

C. 2

D. 3

5. Which boolean expression indicates whether the numbers in two nodes (p and q) are the same. Assume that neither p nor q is null.

A.  $p == q$

B.  $p.data == q.data$

C.  $p.link == q.link$

D. None of the above.

6. What kind of list is best to answer questions such as "What is the item at position n?"

A. Lists implemented with an array.

B. Doubly-linked lists.

C. Singly-linked lists.

D. Doubly-linked or singly-linked lists are equally best

7. Consider the following pseudo code:

```
declare a stack of characters
while ( there are more characters in the word to read )
{
  read a character
  push the character on the stack
}
while ( the stack is not empty )
{
  pop a character off the stack
  write the character to the screen
}
```

What is written to the screen for the input "oranges"?

A. oage

B. oranges

C. segnaro

D. oorraannggeess

8. What is the value of the postfix expression  $6\ 3\ 2\ 4\ +\ -\ *$ :

A. Something between -15 and -100

B. Something between -5 and -15

C. Something between 5 and -5

D. Something between 5 and 15

E. Something between 15 and 100



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9. Given the method declaration as follows:

```
void quiz(int i)
{
    if (i > 1)
    {
        quiz(i / 2);
        quiz(i / 2);
    }
    System.out.print("*");
}
```

How many asterisks are printed by the method call `quiz(5)`?

- A. 3
- B. 4
- C. 7
- D. 8
- E. 9

10. What is the minimum number of nodes in a full binary tree with depth 3?

- A. 3
- B. 4
- C. 8
- D. 11
- E. 15

## B. Answer the following questions

11. (20%, 5% each)

- (a) True or False. In a breadth-first traversal of a min heap, the first item printed out is always the smallest one. If true, explain why; if false, give an example where it is false.
- (b) True or False. In a preorder traversal of a binary search tree, the first item printed out is always the smallest one. If true, explain why; if false, give an example where it is false.
- (c) If you are sorting a million items, how much faster (roughly) is a heap sort than an insertion sort? (Note:  $\log(1,0000,000) = 20$ .)
- (d) Considering the following rules for sorting a string:
  - (1)  $ba \rightarrow ab$
  - (2)  $ca \rightarrow ac$
  - (3)  $cb \rightarrow bc$

Step by step list how you use the “least-used first” conflict resolution strategy to complete the sorting for string “cbaca”.

12. (8%, 2% each)

What is the order of each of the following tasks? (Choose from  $O(1)$ ,  $O(\log_2 n)$ ,  $O(n)$ ,  $O(n \log_2 n)$ ,  $O(n^2)$ ,  $O(2^n)$ ; each order may appear more than once.)

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- (a) Popping an item off a stack containing  $n$  items.
- (b) Performing a Towers of Hanoi algorithm with  $n$  disks.
- (c) Using quicksort to sort an array of  $n$  integers, in the average case.
- (d) Inserting a single item into a binary search tree containing  $n$  items, in the average case.

13. (6%)

A stack of integers aStack has the following private data:

top: 4 (the array index starts counting from 0)

items: 8 0 0 4 7 10 -43223 0 78623 -87899

What is the output of the following code?

```
int x;
while (!aStack.isEmpty()){
    aStack.pop(x);
    cout << x << " ";
}
```

14. (8%)

What is the output of the following program?

```
#include<iostream>
int binarySearch(const int anArray[], int first, int last, int value){
    cout << "binarySearch: first = " << first
        << ", last = " << last << ".\n";
    if (first > last)
        return -1;
    else{
        int mid = (first + last)/2;
        if (value == anArray[mid])
            return mid;
        else if (value < anArray[mid])
            return binarySearch(anArray, first, mid-1, value);
        else
            return binarySearch(anArray, mid+1, last, value);
    } // end else
} // end binarySearch
int main(){
    int a[] = {1,4,5,10,12,18,25,31,107};
    cout << binarySearch(a,0,8,12) << endl;
    cout << binarySearch(a,0,8,15) << endl;
}
```

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15. (8%)

Write the pseudo code of a depth first search-based algorithm to determine the minimal spanning tree (MST) of a graph. Use your algorithm to find the MST for a graph  $G = (V, E)$ ,  $V = \{1, 2, 3, 4, 5, 6\}$ ,  $E = \{(1, 2), (2, 3), (3, 4), (4, 5), (1, 5), (2, 4), (2, 6), (1, 6), (4, 6), (5, 6)\}$ , and the cost for above edges are  $\{16, 5, 9, 6, 10, 8, 11, 21, 14, 19\}$ , respectively.



# 國立中山大學 102 學年度碩士暨碩士專班招生考試試題

科目名稱：管理資訊系統【資管系碩士班甲組、乙組】

題號：442004

※本科目依簡章規定「不可以」使用計算機

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1. 資訊安全是目前企業極重視的議題，資訊安全管理系統(Information Security Management System, ISMS)是一套能有系統地分析與管理資訊風險的方法，導入 ISMS 可分為 6 個階段，試說明各階段的活動內容為何？(15 分)
2. 企業創新係指企業改變其經營思維、商業模式或是企業流程、產品或服務等，並透過組織變革或轉型來創造企業價值的過程。資訊系統(Information System, IS)對企業創新扮演重要的促成者角色，請分別就 (1) IS 如何被應用於企業產品或服務之整合創新，(2) IS 如何被應用於與外部供應鏈之整合或協調創新，各舉二例說明之。(20 分)
3. 3.1 何謂行動商務(Mobile Commerce, M-commerce)？請舉一例說明其應用。(5 分)  
3.2 何謂無所不在商務(Ubiquitous Commerce, U-commerce)？請舉一例說明其應用。(5 分)  
3.3 請從提供之服務特徵或本質來比較 M-commerce 與 U-commerce 之差異。(5 分)
4. 所謂 IT 投資的「生產力矛盾現象」(Productivity Paradox) 指的是：從經濟學的投資報酬率的角度來分析，企業 IT 投資愈多，卻不見得比投資少的同業有更高的生產力與獲利率，請問這個矛盾現象的主要原因有那些？且如果此矛盾現象存在的話是否企業要減少 IT 的投資？(25 分)
5. 近年來資訊科技不斷的快速進步演化，請詳述說明最近「電腦硬體平台」與「電腦軟體平台」的主要演進趨勢各為何？這些演進對企業的 MIS 有那些重要的衝擊與影響？(25 分)



# 國立中山大學 102 學年度碩士暨碩士專班招生考試試題

科目名稱：英文【資管系碩士班甲組、乙組、丙組】

題號：442005

※本科目依簡章規定「不可以」使用計算機

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This exam consists of two parts: (1) a Grammar, Vocabulary, and Punctuation part, and (2) a Reading Comprehension part. The total number of questions is 50 (2 points per correct answer).

- For the Grammar, Vocabulary, and Punctuation part, choose the word or phrase that fits best in the blank of the given sentence.
- For the Reading Comprehension part, choose the answer that comes closest to the meaning of the text.

## 1. Grammar, Vocabulary, and Punctuation

1. The strongest evidence of there \_\_\_\_ life on Mars has recently been found.  
a. is                      b. was                      c. being                      d. humanoid
2. Brad and Angelina have quite a \_\_\_\_ of children now.  
a. number                      b. collection                      c. amount                      d. group
3. Greek people will have to \_\_\_\_ confront their economic problems.  
a. roundly                      b. squarely                      c. tangentially                      d. now
4. Daniel is a nice guy, but a bit \_\_\_\_ politeness.  
a. lack of                      b. not so                      c. too                      d. lacking in
5. People in China and India are \_\_\_\_ wealthier than 50 years ago.  
a. very much                      b. very many                      c. financial                      d. most
6. Will newspaper publishing still be a \_\_\_\_ industry in 2020?  
a. potential                      b. increasing                      c. viable                      d. decline
7. Spanish and Portuguese are the \_\_\_\_ languages of Argentina and Brazil.  
a. various                      b. respective                      c. de facto                      d. respectable
8. After parking the car, \_\_\_\_ slid down the steep, slippery road.  
a. it                      b. Jennifer                      c. the keys                      d. they
9. In ten, seven, or \_\_\_\_ five years, desktop computers will have disappeared.  
a. more than                      b. about                      c. mostly                      d. even
10. Why do queens often wear such \_\_\_\_ hats?  
a. unbecoming                      b. unbearable                      c. unavailing                      d. uncanny
11. What time today did the professor say you had to hand in the assignment \_\_\_\_?  
a. at the latest                      b. finally                      c. by                      d. on
12. She studies medicine, even though she cannot \_\_\_\_ sick people.  
a. abate                      b. abide                      c. abet                      d. ablate
13. Don't call him on a Sunday morning: quietness at that time, to him, is \_\_\_\_.  
a. sacrilege                      b. sacrosanct                      c. sacerdotal                      d. secular
14. Off and on, Sylvester \_\_\_\_ health problems all his life.  
a. has                      b. was been having                      c. has been having                      d. is having
15. As she grew older, her knowledge of Chinese philosophy \_\_\_\_.  
a. deepens                      b. deepened                      c. deepening                      d. profound

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科目名稱：英文【資管系碩士班甲組、乙組、丙組】

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16. Use your time well \_\_\_\_\_ you won't be able to finish your task!  
a. : or                      b. , or                      c. ,                      d. ;
17. I like the \_\_\_\_\_ 7-Eleven stores in Taiwan's cities and villages.  
a. convenience                      b. ubiquitous                      c. everywhere                      d. ulterior
18. We spent the holiday at my wife's \_\_\_\_\_ house.  
a. parents                      b. parents'                      c. parent's                      d. parents's
19. Sandra is smart, but the graduate entrance exam remains a \_\_\_\_\_ obstacle for her.  
a. fortuitous                      b. formative                      c. foundational                      d. formidable
20. Swimming across Sun Moon Lake \_\_\_\_\_ exhausted!  
a. really is                      b. would leave anyone                      c. did leave anyone                      d. really was
21. During their life together, her taste in music \_\_\_\_\_ from his.  
a. diverged                      b. diversified                      c. directed                      d. divided
22. When bicycling in Kaohsiung, \_\_\_\_\_ can be very dangerous to everyone on the road.  
a. traffic                      b. the sun                      c. cars                      d. teenagers
23. The whole point of education is to allow people to \_\_\_\_\_ their promise and potential.  
a. realize                      b. keep                      c. foster                      d. maintain
24. There was hardly any water in the reservoirs: the drought had \_\_\_\_\_ emptied them.  
a. already                      b. entirely                      c. all but                      d. eventually
25. The teacher insisted angrily that the recalcitrant boy \_\_\_\_\_ the principal.  
a. goes to                      b. see                      c. goes to see                      d. sees
26. Carla was so \_\_\_\_\_ in playing "Temple Run" on her phone that she forgot where she was.  
a. interested                      b. absorbed                      c. transported                      d. busy
27. What \_\_\_\_\_ we to make of his strange behavior?  
a. are                      b. reaction are                      c. conclusion are                      d. deduction are
28. James: "You probably are not hungry yet?"  
Karola: "\_\_\_\_\_. I just ate a piece of cheese cake."  
a. Yes, indeed                      b. No, indeed                      c. Me neither                      d. Me too
29. \_\_\_\_\_ this information on time, we then would not have missed the plane.  
a. Had I                      b. Had I been given                      c. I haven't had                      d. Given
30. Did you ever \_\_\_\_\_ emigrating to Australia?  
a. think                      b. inquire                      c. consider                      d. want to
31. \_\_\_\_\_ a light concussion, I experienced no bad effects from the car accident.  
a. Next to                      b. Apart from                      c. In addition to                      d. Because of



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32. Celine could not hold back her tears when she heard Lance Armstrong \_\_\_\_ doping.  
a. confess to use    b. confessing to use    c. confess to using    d. confess to having used
33. Rihanna (the singer \_\_\_\_ my parakeet is named) is back with rapper Chris Brown again.  
a. after whom    b. like who    c. for whom    d. to whom
34. The military police in Cairo \_\_\_\_ the crowd of young protesters ruthlessly.  
a. disposed    b. displayed    c. dissembled    d. dispersed
35. \_\_\_\_ the Chinese government calls it fog, everyone knows Beijing is shrouded in smog.  
a. Although    b. Despite    c. Unless    d. Unlike
36. Concerned about his injuries, he went to a doctor \_\_\_\_ a specialist in his field.  
a. who was    b. , who was    c. , that was    d. that was
37. That politician's remark really wasn't \_\_\_\_ to the discussion, I thought.  
a. necessary    b. pertinent    c. reliable    d. remedial
38. For a nervous person like Damien, going to the dentist is a real \_\_\_\_.  
a. adventure    b. chore    c. blast    d. ordeal
39. Did you know that the word *mascara* \_\_\_\_ from the Italian word for *mask*?  
a. is derailed    b. is despoiled    c. is derived    d. is deracinated
40. Looking back on his life, he regretted how much of it he had \_\_\_\_.  
a. squabbled    b. squashed    c. squandered    d. squatted

## 2. Reading Comprehension

### I

The first bicycles were made of wood. Cycle manufacturers then switched to steel tubes. These days, for high-end bikes where weight is at a premium, they use aluminum alloys or, lighter even, carbon fiber. But Izhar Gafni, an amateur cyclist, proposes to go back to using wood—or, rather, a derivative of wood, namely cardboard.

Mr Gafni, who is based in Israel, spent years trying to work out how to make a cardboard bicycle able to support the weight of a human being. The trick is twofold. First, he folds the cardboard—made from recycled paper—to increase its strength. Then, once it is folded, he treats the result with a proprietary resin that holds it in shape and stiffens it, before cutting it into the form of the component required. A second application of resin renders the component waterproof, and a lick of lacquer makes it look good. The result is stronger than carbon fiber.

The bike's frame, wheels, handlebars and saddle are all made of cardboard in this way. The tires are composed of solid rubber, which is recycled from old car tires. That makes the ride a little harder than if the tires were pneumatic, but means they cannot be punctured.

The chain, based on the timing belt of a car, is also made from car-tire rubber. The pedals are plastic recycled from bottles and the brakes are recycled too. The finished product weighs 9kg, a bit less than an

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ordinary steel-framed bike, and can carry a rider weighing 220kg.

Mr Gafni's target market is the poorer countries of the world. Because manufacturing the cardboard bike will, he reckons, cost \$9-12 a unit, his design is far more affordable than a steel-framed bike.

(Adapted from The Economist, 1 Dec. 2012)

41. Mr. Gafni's bike is made of  
a. aluminum alloy      b. steel tubing      c. carbon fiber      d. a wood derivative
42. Because Mr. Gafni treats the material with which he builds his bike with a resin,  
a. it becomes strong and attractive to look at;  
b. it becomes water-proof and attractive to look at;  
c. it becomes strong and water-proof;  
d. it becomes strong and attractive to look at
43. The weight of the various makes of bicycles, from heavy to light is:  
a. aluminum, steel, carbon fiber, cardboard bikes;  
b. steel, carbon fiber, cardboard, aluminum bikes;  
c. steel, cardboard, aluminum, carbon fiber bikes;  
d. cardboard, steel, aluminum, carbon fiber bikes
44. Mr. Gafni intends  
a. to sell his bikes for 9-12 dollars in the poorer countries of the world;  
b. to manufacture his bikes for 9-12 dollars in the poorer countries of the world;  
c. to use non-pneumatic tires for bikes to be sold in the poorer countries of the world;  
d. to sell his bikes in the poorer counties of the world
45. Mr. Gafni's bike has tires that,  
a. are wider than ordinary bicycle tires, because they are made of recycled car tires;  
b. are made of solid rubber, so that you can ride faster on them;  
c. are made of solid rubber, so that they can support the weight of 220kg riders;  
d. give a harder ride but also cannot puncture

## II

Scientists have long thought that aging could be caused by molecular damage that accumulates in our bodies over the course of time. The damage is an unavoidable by-product of breathing oxygen and other metabolic processes that are necessary to life. Eventually, damaged cells stop working, or worse, adopt new functions that trigger cancerous growth or degrade important tissues in the brain, skin and other organs.

But investigators have conducted several experiments over the past few years that challenge this so-called oxidative stress theory of aging. For example, a tiny mouse-like creature known as the naked mole rat manages to live up to 30 years (about 10 times longer than a similarly sized mouse) despite accumulating a much greater level of oxidative damage in its tissues than other rodents.

Now there are three ideas that scientists have come up with to try to explain why naked mole rats live so long: Maybe oxidative damage doesn't cause aging. Maybe naked mole rats are evolutionary oddities. And maybe it's not oxidative damage that is the problem but how the cell responds to the damage.  
(Adapted from scientificAmerican.com)

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46. This article suggests that
- aging is caused by molecular damage that accumulates in our bodies over time;
  - the oxidative stress theory of aging may not fully explain why we age;
  - the naked mole rat accumulates an unusually high level of oxidative damage in its tissues;
  - the naked mole rat is an evolutionary oddity.
47. Molecular damage is
- the unavoidable by-product of breathing polluted air;
  - explained by the so-called oxidative stress theory of aging;
  - an unavoidable metabolic process;
  - the unavoidable by-product of metabolic processes, such as breathing, necessary for life
48. Damaged cells
- can assume functions that cause cancerous growths or harm important body tissues;
  - can impair breathing and other metabolic processes;
  - occur especially in the brain, skin, and other organs;
  - cause molecular damage that accumulates in our bodies over the course of time
49. Scientists have the idea, among other things, that
- oxidative damage does not cause aging;
  - oxidative damage probably does not cause aging;
  - oxidative damage is one of the factors that cause aging;
  - perhaps oxidative damage is not the cause of aging
50. The main purpose of the scientists referred to in this article is probably
- to understand how aging effects human bodies;
  - to understand what causes aging, especially in small rodents;
  - to understand how humans may live longer;
  - to understand what causes aging, especially in human beings

End of the English Entrance Examination

