111學年度 學士後醫學系招生考試

計算機概論與程式設計試題封面

考試開始鈴響前，請勿翻閱本試題！

★考試開始鈴響前，請注意：

一、除准考證、應考文具及一般手錶外；行動電話、穿戴式裝置及其他物品均須放在臨時置物區。

二、請務必確認行動電話已取出電池或關機，行動電話及手錶的鬧鈴功能必須關閉。

三、就座後，不可擅自離開座位或與其他考生交談。

四、坐定後，雙手離開桌面，確認座位號碼、答案卡號碼與准考證號碼相同，以及抽屜中、桌椅下或座位旁均無非考試必需用品。如有任何問題，請立即舉手反應。

五、考試開始鈴響前，不得翻閱試題本或作答。

六、考試全程不得吃東西、喝水及嚼食口香糖。

七、違反上述規定，依「筆試規則及違規處理辦法」議處。

★作答說明：

一、考試時間：100 分鐘。

二、本試題(含封面)共 11 頁，如有缺頁或毀損，應立即舉手請監試人員補發。

三、本試題單選題共 30 題、申論題 4 題，共計 100 分；每題單選題答錯倒扣，不作答不計分。

四、單選題答題依題號順序劃記在答案卡上，寫在試題本上無效；答案卡限用 2B 鉛筆劃記，若未按規定劃記，致電腦無法讀取者，考生自行負責。

五、申論題部分以「答案卷」作答，作答時不得使用鉛筆，違者該科答案卷不予計分；限用黑色或藍色墨水的筆書寫。

六、試題本必須與答案卡一併繳回，不得攜出試場。

【單選題】每題 2 分，共計 60 分。答錯 1 題倒扣 0.5 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。

1. Which one of the following algorithms is **NOT** a symmetric algorithm?
   (A) DES (B) AES
   (C) Caesar Cipher (D) RSA
   (E) Playfair Cipher

2. Ping is a computer network administration utility used to test the reachability of a host on the Internet. Ping is implemented by which of the following protocols?
   (A) IGMP (B) XMPP (C) RCTP (D) ICMP (E) SIP

3. For a specific CPU design, there are three instruction classes as depicted in Table 1 and run at a clock rate of 100 MHz.

Table 1 CPU Design

Instruction Class	A	B	C
CPI	1	3	2

For a given program, a compiler can produce the following executed instruction counts as depicted in Table 2. Please calculate the average CPI of this compiler.

Table 2 Given Program

Instruction Class	A	B	C
Instruction Counts	10	1	1

   (A) 4
   (B) 2
   (C) 1.25
   (D) 0.5
   (E) All of the above are wrong.

4. Which one MAX_VALUE of primitive data type in C is greater than others?
   (A) int
   (B) unsigned int
   (C) signed int
   (D) double
   (E) long

5. Unsupervised learning is a type of algorithm that learns patterns from untagged data. Which of the following learning techniques is an unsupervised learning technique?
   (A) Decision tree
   (B) K-means clustering
   (C) Support vector machine
   (D) k-NN
   (E) Random Forest

6. Given a prefix expression "+ + (9) × (8) (7) × + × (6) (5) (4) (3)", please calculate the result.
   (A) 167 (B) 147 (C) 127 (D) 117 (E) 107

7. Which type of memory or storage components has the shortest response time?
   (A) Main memory
   (B) CPU cache
   (C) Processor registers
   (D) Floppy disk drives
   (E) Solid-state drive

8. Given a C code as follows, which random range initializes the array myList?

```
for (int i = 0; i < ARRAY_SIZE; i++)
{
    myList[i] = rand() % 100;
}
```

   (A) 0 to 100
   (B) 1 to 100
   (C) 0 to 99
   (D) 1 to 99
   (E) All the listed answers are incorrect.

9. Which one of the following sections is shared by the threads in the same multithreaded process?
   (A) code (B) registers
   (C) stack (D) program counter
   (E) heap

10. Given a C code as follows, which one of the following is the return value of f(12, -20)?

```
int f( int a , int b )
{
   return a - ( ( a – b ) & ( ( a – b ) >> 31 ) ) ;
}
```

(A) -32 (B) -20 (C) 0 (D) 12 (E) 20

11. Consider the following C code. Please indicate the values of x and y after execution.

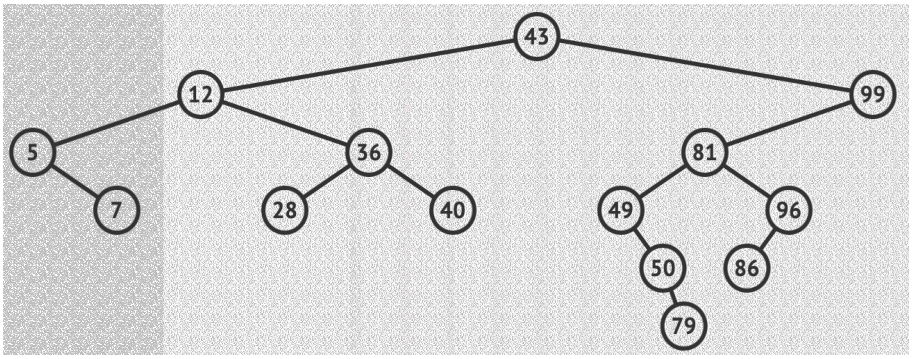
```
int a=10, b=5;
int x, y;

x = (a++) + (a++) + (b++);
y = (++a) + (++a) + (++b);
```

(A) x = 26, y = 35 (B) x = 26, y = 34
(C) x = 26, y = 29 (D) x = 26, y = 30
(E) x = 29, y = 26

12. Which one is the actual execution order of the following statements in SQL?
   [1] SELECT [DISTINCT]
   [2] FROM
   [3] WHERE
   [4] GROUP BY
   [5] ORDER BY

(A) SELECT, WHERE, GROUP BY, FROM, ORDER BY
(B) FROM, WHERE, GROUP BY, SELECT, ORDER BY
(C) FROM, WHERE, ORDER BY, SELECT, GROUP BY
(D) WHERE, FROM, ORDER BY, SELECT, GROUP BY
(E) WHERE, FROM, GROUP BY, SELECT, ORDER BY

13. Given a binary tree as follows, please indicate the result of pre-order traversal.



(A) 7, 5, 28, 40, 36, 12, 79, 50, 49, 86, 96, 81, 99, 43
(B) 5, 7, 12, 28, 36, 40, 43, 49, 50, 79, 81, 86, 96, 99
(C) 43, 12, 5, 36, 7, 28, 40, 99, 81, 49, 96, 50, 86, 79
(D) 43, 12, 99, 5, 36, 81, 7, 28, 40, 49, 96, 50, 86, 79
(E) 43, 12, 5, 7, 36, 28, 40, 99, 81, 49, 50, 79, 96, 86

14. Given two prime numbers “3” and “7” and a private key “23”, what is a public key derived by RSA?.

(A) 3 (B) 5 (C) 7 (D) 9 (E) 11

15. Consider the following C code. Please indicate the value of x after execution.

```
int i,j;
int x = 5;

for(i=1; i<3; i++)
{
    for(j=1; j<i*2; j++)
        x+=3;
}
```

(A) 8 (B) 11 (C) 14 (D) 17 (E) 20

16. Consider a series of matrices $M_{2\times3}$, $M_{3\times7}$, $M_{7\times2}$, $M_{2\times9}$, $M_{9\times4}$. Concerning the most efficient way to multiply this sequence of matrices, how many multiplication operations does it need?

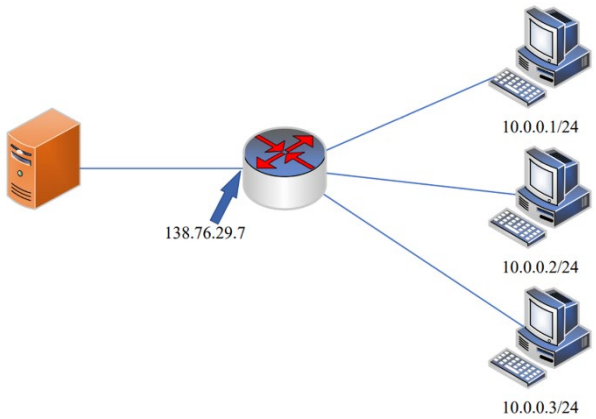
(A) 112 (B) 126 (C) 142 (D) 156 (E) 178

17. Consider five processes as follows. They arrived in the order of P1, P2, P3, P4, and P5 at time 0. What is the total turnaround time of all processes by using the shortest-job-first (SJF) scheduling algorithm?

Process	Burst time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

(A) 25 (B) 30 (C) 35 (D) 40 (E) 45

18. All 10.0.0.0/24 datagrams leaving local network have same single source IP address 138.76.29.7, different source port numbers. What technology does such a mechanism rely on?



(A) NAT (B) NNTP (C) SMTP (D) ICMP (E) PPTP

19. Consider the following C code:

```
int x = 5;
for (int a = 1; a < 6; a++){
   int b = 1;
   while (b < 9){
       x += 2;
       b += 2;
   }
}
printf("%d", x);
```

After the code is executed, what is the output?

(A) 25 (B) 35 (C) 45 (D) 55 (E) 65

20. Consider an infix expression: (A+B)*C+D*(E-F).
What is its prefix expression?

(A) **A++BC-DEF
(B) ++A*BC-*DEF
(C) +*+ABC*D-EF
(D) *+ABC+*-DEF
(E) +*+ABC*-DEF

21. Consider the following C code:

```
int array[5] = {100, 215, 321, 254, 165};
int *k = &array[1];
*k-- += 5;
*(++k) += 9;
*(k++) += 7;
*k++ -= 15;
for(int i = 0; i < 5; i++)
    printf("%d ", array[i]);
```

What is the output of the above program?

(A) 100 236 306 254 165
(B) 100 220 330 261 150
(C) 105 224 328 239 165
(D) 100 220 337 239 165
(E) Segmentation fault

22. Which one of the following terms is **NOT** the advantages of paging in memory management?

(A) same page size
(B) preventing internal fragmentation
(C) preventing external fragmentation
(D) enabling memory protection
(E) enabling memory sharing

23. Which one of the following protocols is implemented on top of SSL/TLS?

(A) HTTP (B) HTTPS (C) POP3
(D) SMTP (E) TELNET

24. Refer to Table 3 and Table 4, please indicate the **CORRECT** SQL statement that can output as depicted in Table 5.

Table 3 movies

id	movie	year	actor
m_001	The Matrix	1999	a_002
m_002	Iron Man	2008	a_010
m_003	Doctor Strange	2016	a_003

Table 4 actors

id	name	salary
a_001	Brad Pitt	250M
a_002	Keanu Reeves	200M
a_003	Benedict Cumberbatch	150M

Table 5 output

movie	name
The Matrix	Keanu Reeves

(A) SELECT * FROM movies

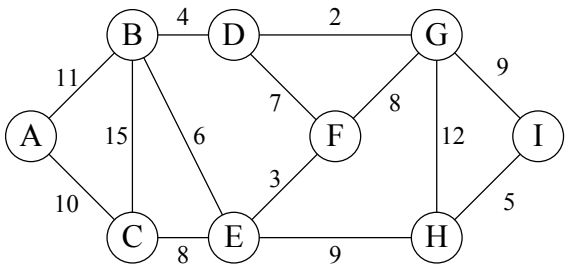
(B) SELECT TOP 1 movies.movie, actors.name FROM movies INNER JOIN actors ON movies.actor = actors.id ORDER BY actors.salary DESC

(C) SELECT movies.movie, actors.name FROM movies INNER JOIN actors ON movies.actor = actors.id ORDER BY actors.salary

(D) All of the above can output the same results, as shown in Table 5.

(E) None of the above can output the same results, as shown in Table 5.

25. Consider a graph as follows. Starting from node D, what is the visiting sequence of all nodes by using depth-first-search. If you have multiple choices, just follow the alphabetical order.



(A) D, B, A, C, E, F, G, H, I

(B) D, F, G, I, H, E, B, C, A

(C) D, F, G, I, H, E, C, A, B

(D) D, B, A, C, E, H, I, G, F

(E) D, F, G, I, H, E, C, B, A

26. Which one of the following has the best time complexity?
    (A) $\log n$ (B) $n/2$ (C) n
    (D) $n \log n$ (E) $2n$

27. Machine learning can be divided into supervised learning and unsupervised learning. The two problems most commonly dealt with in supervised learning are regression and classification. When you predict the target to be a continuous numerical value, we call it regression; if the target is discrete, we call it classification. Which one of the following common algorithms is **NOT** a classification algorithm?
    (A) SVM (B) Linear
    (C) Decision trees (D) KNN
    (E) Naive Bayes

28. Which of the following terms is **NOT** included in 5 V's of Big Data?
    (A) Volume (B) Variety
    (C) Value (D) Velocity
    (E) Volatility

29. Regarding the evaluation of machine learning, a confusion matrix contains TP (true positive) = 500, FN (false negative) = 100, FP (false positive) = 50, and TN (true negative) = 550 is proposed. Please indicate the value of recall for this model.
    (A) 1050 / 1200
    (B) 500 / 600
    (C) 500 / 550
    (D) 500 / 650
    (E) 500 / 1050

30. Which of the following subnets does **NOT** include IP address 192.168.30.57?
    (A) 192.168.30.26/24 (B) 192.168.28.73/22 (C) 192.168.30.125/30
    (D) 192.168.41.25/18 (E) 192.168.3.253/16

【申論題】每題 10 分，共計 40 分。未作答或作答錯誤，不給分亦不扣分。

1. Please explain the five states that a process may be in.

2. Alice writes the following code and expects that the process prints “Hello Kitty” four times. However, the process prints “Hello Kitty” three times only! Please describe the reason why Alice’s code prints “Hello Kitty” three times instead of four.

```
#include <stdio.h>
int main( )
{
   for( double f = 0.0; f <= 0.3; f += 0.1 )
   {
       printf( “Hello Kitty.\n ” );
   }
  return 0;
 }
```

3. Consider the following processes. Please draw the schedules (Gantt Chart) and calculate the average waiting time for the **Preemptive Shortest Job First**, and **Round Robin (time-quantum = 4 ms)** scheduling policies, respectively.

Process	Arrival Time	CPU Burst Time
P1	0 ms	15 ms
P2	3 ms	7 ms
P3	5 ms	2 ms
P4	7 ms	3 ms

4. Consider a weighted graph (the edges show the costs) as follows. Please use the Kruskal Algorithm to get the corresponding minimum (cost) spanning tree. Not only the result but also the whole procedure steps should be presented in your answer.