國立中山大學 113 學年度
碩士班暨碩士在職專班招生考試試題

科目名稱：計算機概論【資管系碩士班甲組、乙組】

－作答注意事項－

考試時間：100 分鐘

- **考試開始鈴響前不得翻閱試題，並不得書寫、劃記、作答。**請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。

- **答案卷限用藍、黑色筆(含鉛筆)書寫、繪圖或標示，**可攜帶橡皮擦、無色透明無文字墊板、尺規、修正液（帶）、手錶(未附計算器者)。每人每節限使用一份答案卷，請衡酌作答。

- 答案卡請以 2B 鉛筆劃記，不可使用修正液（帶）塗改，未使用 2B 鉛筆、劃記太輕或污損致光學閱讀機無法辨識答案者，後果由考生自負。

- 答案卷（卡）應保持清潔完整，不得折疊、破壞或塗改應考證號碼及條碼，亦不得書寫考生姓名、應考證號碼或與答案無關之任何文字或符號。

- 可否使用計算機請依試題資訊內標註為準，如「可以」使用，廠牌、功能不拘，唯不得攜帶書籍、紙張（應考證不得做計算紙書寫）、具有通訊、記憶、傳輸或收發等功能之相關電子產品或其他有礙試場安寧、考試公平之各類器材入場。

- **試題及答案卷（卡）請務必繳回，未繳回者該科成績以零分計算。**

- **試題採雙面列印，考生應注意試題頁數確實作答。**

- **違規者依本校招生考試試場規則及違規處理辦法處理。**

第 1~10 題為單選題，每題 3%。

1. A CPU performs instruction execution by fetch-decode-execute-store cycle. Which component executes the instruction?
    A. CU
    B. ALU
    C. IR
    D. RAM

2. Which of the following statements about network protocols is wrong?
    A. UDP builds up reliable connections.
    B. DNS queries are transmitted through UDP.
    C. HTTP requests and responses are transmitted through TCP protocol.
    D. FTP responses are transmitted through TCP protocol

3. Which of the following statements about Internet of Things (IoTs) is wrong?
    A. For security purpose, IoT devices should be deployed in internal network.
    B. All IoT devices have connectivity.
    C. Bluetooth earphones are IoT devices.
    D. An IP camera is an IoT device and safer than a personal computer.

4. Which of the following statements about wireless networks is wrong?
    A. Wireless networks have the exposed node problem.
    B. Wireless networks have the hidden node problem.
    C. 802.11 does not run on ISM radio band.
    D. 802.11 uses the multiple access with collision avoidance algorithm to transmit data.

5. Given a binary tree T in which each internal node of T stores a single character. If its inorder traversal yields GOODBOOK and its postorder traversal yields GOOOBKOD. What is its preorder traversal?
    A. DOGBOOOK
    B. DOGOBOOK
    C. DOOGOBOK
    D. DOGOOBOK

6. Which of the following statements about hash table is wrong?
    A. In the average cases, search in a hash table is O(1).
    B. In the average cases, insert in a hash table is O(1).
    C. In the average cases, delete in a hash table is O(N).
    D. An imperfect hash function may result in many collisions.

7. Which of the following statements about ARP is wrong?
    A. ARP is used to build up a mapping table of IP addresses to MAC addresses.
    B. ARP is a network protocol at the network layer of the OSI model.
    C. ARP assigns a host an IP address dynamically.
    D. An ARP cache is a collection of ARP entries that are created when an IP address is resolved to a MAC address.

8. Which of the following statements about malware is wrong?
    A. A computer might be infected without connecting to a network.
    B. PDF files may contain malware.
    C. Image files may include malware.
    D. Web browsing is safe and will not get infected by malware.

9. Which of the following statements about process scheduling is wrong?
    A. FIFO scheduling may result long waiting time.
    B. Round-robin scheduling has the shortest waiting time.
    C. A very large time quantum in round-robin scheduling results in FIFO scheduling.
    D. Round-robin scheduling is suitable for interactive systems as it has short response time.

10. If binary trees are represented in arrays, what formula can be used to locate the left child of node i?
    A. 2i.
    B. 2i+1.
    C. 2i-1.
    D. None of the above.

第 11~15 題為複選題，每題 4%。

11. A tautology is a compound statement which always results in Truth value. Which one(s) of the following statements is(are) tautology(tautologies)?
    A. $(p \wedge q) \rightarrow q$
    B. $q \rightarrow (p \wedge q)$
    C. $p \vee (p \rightarrow q)$
    D. $q \vee (p \rightarrow q)$

12. Logical inference is used to create new sentences that logically follow from a given set of predicate calculus sentences (KB). An inference rule is sound if every sentence X produced by an inference rule operating on a KB logically follows from the KB. A rule is sound if its conclusion is true whenever the premise is true. Which one(s) of the following rules is(are) sound?
    A. Premise: $p, p \rightarrow q$; conclusion: q
    B. Premise: p, q; conclusion: $p \wedge q$
    C. Premise: $p \wedge q$; conclusion: p
    D. Premise: $\neg\neg p$; conclusion: p

13. Which one(s) of the following statements about time complexity is/are correct?
    A. The average time complexity of search in a double-linked list is O(N).
    B. The worst time complexity of insertion in a double-linked list is O(N).
    C. The average time complexity of search in a binary search tree is O(logN).
    D. The worst time complexity of search in a binary search tree is O(N).

14. Given the C code below, which one(s) of the execution results is/are correct?

```c
int main() {
  int n, i, c = 0;

  printf("Enter a number: ");
  scanf("%d", &n);

  if (n <= 1) {
    printf("The number belongs to N\n");
    return 0;
  }

  for (i = 2; i <= sqrt(n); i++) {
    if (n % i == 0) {
      c++;
      break;
    }
  }

  if (c == 0) {
    printf("The number belongs to P\n");
  } else {
    printf("The number belongs to N\n");
  }
  return 0;
}
```

A.　Enter a number: 8
The number belongs to N
B.　Enter a number: 7
The number belongs to P
C.　Enter a number: 15
The number belongs to P
D.　Enter a number: 17
The number belongs to P

15. Mike is given an assignment to practice recursion. He has a fraction of code below. Which one(s) of the following fill-outs is/are correct?

```c
#include <stdio.h>

// Function that prints the reverse of the passed string
void reverse(char *str, int index, int n)
{
    char temp;

    // return if it reaches at the end of the string
    A

    // stores the char before recursive call
    B
    // calling recursive function
    C

    // printing each stored character while recurring back
    printf("%c", temp);
}

int main()
{
    char a[] = "MIS@NSYSU is the best";
    int n = sizeof(a) / sizeof(a[0]);
    D
    return 0;
}
```

A. If (index == n) return;
B. temp = str[index];
C. reverse(str, index + 1, n);
D. reverse(a, n, 0);

第 16~19 題為問答題。

16. Please describe the procedure of Proof of Work consensus mechanism used in blockchain technology. (10%)

17. Please write the Hanoi tower's recursive function in C programming language:
    void hanoi (int n, char A, char B, char C).
    Suppose there are *n* disks in tower A with indexes *1* to *n*, and we want to move all disks from tower A to tower C. (20%)

18. What is the function of TTL field in IP protocol? (10%)

19. Please describe the procedure of CSMA/CD method used in Ethernet. (10%)