# 國立成功大學

# 111學年度碩士班招生考試試題

編　號：242

系　所：資訊管理研究所

科　目：計算機概論

日　期：0220

節　次：第 2 節

備　註：不可使用計算機

※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

A.

A-1. Multiple choice questions:　(choose only **ONE** answer for a question; 3% for each question)

(1) What kind of operating system programs will be permanently resident in memory?
　　a. Compiler programs.
　　b. Supervisory programs.
　　c. Timing programs.
　　d. Gyroscope sensor programs.
　　e. Spooling programs.

(2) The feature of an object-oriented programming language that allow the instances of different objects to respond to the same message differently is called _____.
　　a. portability.
　　b. inheritance.
　　c. messaging.
　　d. encapsulation
　　e. polymorphism

(3) A(n) _____ class is used take the responsibility of instantiating a group of utilities classes (e.g., data access classes).
　　a. factory
　　b. adapter
　　c. domain
　　d. entity
　　e. controller

(4) A backup facility (e.g., an office or a warehouse) that has the necessary components (e.g., space, power, cooling equipment, and Internet connection) of a computer facility, but does not have any computer equipment installed is called a _____.
　　a. service site
　　b. warm site
　　c. cold site
　　d. reference site
　　e. hardware site

(5) Using _____ is one of the most effective protective measures to counteract the network attack strategy of "data diddling."
　　a. digital certificates

　　　b. intruder detection mechanisms

　　　c. encrypted message digest

　　　d. firewalls

　　　e. authentication techniques

(6) Among the basic approaches to utilizing the spectrum available to the wireless local area networks,

　　_____ spreads the data over multiple carrier frequencies to transmit the data in parallel, while those

　　multiple carrier frequencies are spaced to ensure that they do not interfere with one another.

　　　a. frequency-hopping spread spectrum (FHSS)

　　　b. direct sequence spread spectrum (DSSS)

　　　c. service se identifier (SSID)

　　　d. orthogonal frequency division multiplexing (OFDM)

　　　e. carrier sense multiple access with collision avoidance (CSMA/CD)

(7) _____ is an effective data storage structure when every record in the table has to be retrieved (in any order)

　　every time the table is accessed.

　　　a. Hasp

　　　b. Heap

　　　c. Bitmap

　　　d. ISAM

　　　e. B$^+$-Tree.

A-2. Programming and modeling questions:

(1) Explain what an "*association class*" is for and give an example using the format of a class diagram based on the Unified Modeling Language (UML) convention. (8%)

(2) Please write a method (using pseudo code or any programming language that you want) along with the SQL queries needed that allows us to retrieve the information (including movieID, movieTitle, yearReleased, studio, and producer) of all the videos that are directed by a particular director (e.g. Christopher Nolan) and present all the information retrieved on the screen. You can assume that the database connectivity has been established. Additionally, four tables, including Video (including movieID, movieTitle, yearReleased, directorID, studioID, and producerID), Studio (including studioID and studioName), Producer (including producerID, producerFirstName, and producerLastName), and Director (including directorID, directFirstName, and directorLastName), are used to store all those pieces of information of the videos in the relational database. Create and use the data attributes that are not listed in the questions if you find it necessary. (12%)

(3) Please write a method (using pseudo code or any programming language that you want) that performs the task of "*binary search*" using a "*recursive*" approach. (9%)

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Part B

B-1 Multiple Choice Question: Indicate **ONE** answer choice that best completes the statement or answers the question. (3% for each question)

1. In a(n) _____ database, query data is collected from one or more shards of a distributed database, then processed by the database management system (DBMS) to create the query response.
    a. SQL
    b. NoSQL
    c. relational
    d. OLAP
    e. Cloud

2. _____ refers to an industry standard used to support the communication among equipment from several vendors and provide network flexibility.
    a. WAN
    b. LAN
    c. RAN
    d. ORAN
    e. WLAN

3. _____ is a compilation of binary data stored in a single DB field.
    a. Memo
    b. Integer
    c. BLOB
    d. Logical
    e. Record

4. To deal with huge amounts of data and computation involved in Big Data, _____ is a set of frequently used software utilities.
    a. Hadoop
    b. GIMP
    c. KeePass
    d. openSIS
    e. PuTTY

5. _____refers to a virtual space that users can access and immerse via digital devices and interact with other users.

    a.  Multiverse

    b.  Originverse

    c.  Xenoverse

    d.  Zenverse

    e.  Metaverse

B-2 Programming and Short answer

1. Bubble Sort, Selection Sort, and Insertion Sort are basic sorting algorithms to sort numbers. To sort 9, 2, and 4, following table can be used to demonstrate the steps of an ascending bubble sort by only showing swapping steps:

Table1 Bubble Sort steps

| Bubble sorting |
| --- |
| 9 2 4 (Original) |
| 2 9 4 |
| 2 4 9 (Sorted) |

Considering following numbers: 75, 29, 47, 3, and 12

Using the table formation above (Table 1) and only showing the steps with swapping (or insertion), please sort the numbers (75, 29, 47, 3, and 12) ascendingly by

    1) Selection Sort (5%)

    2) Insertion Sort (Please only show the insertion steps, 5%)

    3) Bubble Sort (5%)

note 1: Please draw tables on your answer sheet for each sorting algorithm

note 2: For each table, please clearly indicate which algorithm is used

note 3: in-place sorting

2. Matrix Multiplication (10%)

Following is an example of matrix multiplication between 2 square matrices while row=column=2.

| A | B |
|---|---|
| C | D |

X

| E | F |
|---|---|
| G | H |

=

| AE+BG | AF+BH |
|-------|-------|
| CE+DG | CF+DH |

Considering 2 square matrices A and B while row=column=n, please finish the program in the **BOX** to store the results of the matrix multiplication between 2 matrices to a new square matrix, Result_Matrix[n][n].

note 1: Assuming A and B are not empty.

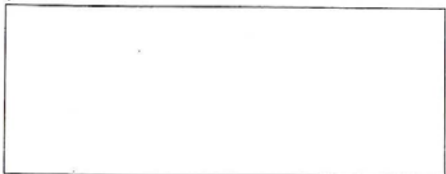note 2: C or C++ are preferable to finish the program.

note 3: You may still use other languages if you think it is clear.

Please copy all program (*Italic*) below on your answer sheet to answer:

```
int A[n][n];
int B[n][n];
int Result_Matrix[n][n]={};

int row=n;
int column=n;

    for(int i=0; i< row; i++)
    {
        for(int j=0; j< column; j++)
        {
            for(int k=0; k< column; k++)
            {




            }
        }
    }
```

3. What is the Von Neumann architecture? What is the Von Neumann Bottleneck? (10%)