

## 1. Single Choice (30%)

Q1. All of the followings are true about classes, except:

- (A) Classes have attributes and behaviors.
- (B) The first class in any C++ program is main.
- (C) An object must be created from a class before it can be used.
- (D) A class's functions hide from the user the complex tasks they perform.

Q2. An exception:

- (A) Terminates program execution.
- (B) Terminates the block where the exception occurred.
- (C) Will terminate the block where the exception occurred unless a catch command stops it.
- (D) Will not terminate a block unless explicitly instructed to do so.

Q3. Assuming that text is a variable of type string, what will be the contents of text after the statement `cin >> text;` is executed if the user types "Hello World!" then presses Enter?

- (A) "H"
- (B) "Hello"
- (C) "Hello World"
- (D) "Hello World!"

Q4. Call-by-reference can achieve the security of call-by-value when:

- (A) The value being passed is small.
- (B) A large argument is passed in order to improve performance.
- (C) A pointer to the argument is used.
- (D) The const qualifier is used.

Q5. Given the following function template

```
template < class T >  
T maximum( T value1, T value2 )  
{  
    if ( value1 > value2 )    return value1;  
    else    return value2;  
}
```

what would be returned by the following two function calls?

```
maximum( 2, 5 );  
maximum( 2.3, 5.2 );
```

- (A) 5 and a type-mismatch error.
- (B) 5 and 5.2.
- (C) 2 and 2.3.
- (D) Two error messages.

Q6. A class member that is to be shared among all objects of a class is called

- (A) A const member
- (B) A reference member
- (C) A static member.
- (D) A value member

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## 2. Multiple Choices (40%)

Q1. Which of the following statement(s) is/are true?

- (A) Using tree structure results in faster searching than using array structure on searching for an English word in a dictionary.
- (B) Using stack structure results in less swaps than using linked list on doing insertion sort.
- (C) Using array structure needs larger space than using linked list on implementing a tree with large depth.
- (D) Prim's algorithm (closely resembles Dijkstra's algorithm) is applied for ensuring a loop-free topology in any bridged Ethernet local area network.

Q2. What are two features of the User Datagram Protocol (UDP)?

- (A) Flow control
- (B) Low overhead
- (C) Connectionless
- (D) Connection-oriented
- (E) Sequence and acknowledgements

Q3. When I browse a webpage with URL <http://www.ncku.edu.tw/>, which protocols/services are usually not involved?

- (A) HTTP
- (B) IP
- (C) ICMP
- (D) DNS
- (E) NAT

Q4. Which statements are correct?

- (A) Cloud computing providers deliver applications via the internet, which are accessed from web browsers and desktop and mobile apps, while the business software and data are stored on servers at a remote location.
- (B) An embedded system is a computer system designed for specific control functions within a larger system, often with real-time computing constraints.
- (C) A user cannot run an application program on the computer without an operating system, unless the application program is self booting.
- (D) Real-time operating systems often use specialized scheduling algorithms so that they can achieve a deterministic nature of behavior.

Q5. Here are several sorting algorithms:

- (A) Quick sort, heap sort and merge sort have time complexity  $O(n \lg n)$  in average case.
- (B) Quick sort, merge sort and select sort are using "divide-and-conquer".
- (C) Comparison sorting algorithms can be linear time complexity.
- (D) Heap sort and merge sort are asymptotically optimal comparison sort.

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3. What is the value of result after the following C++ statements execute? (10%)

```
int a, b, c, d, result;  
a = 4;  
b = 12; c = 37;  
d = 51;  
result = d % a * c + a % b + a;
```

4. Show how to sort the following array in increasing order by using insertion sort algorithm: { 23, 29, 18, 7, 14, 3 } (20%)