＊請在答案卡內作答

單選題 (1~15), 每題 3 分, 不倒扣

1. Which of the following cannot decide unique binary tree?
(A) inorder and preorder   (B) postorder and preorder   (C) postorder and inorder

2. A so-called algorithm is to make a big problem, which breaks into many small problems; if these small problems are resolved, then the original big problem will be solved.
(A) Binary Search (B) Merge Sort (C) Quick Sort (D) All of the above

3.

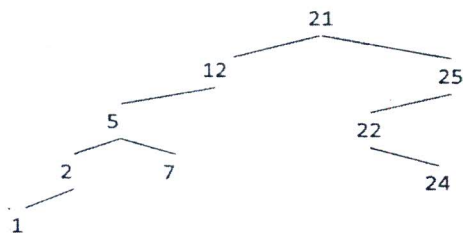| 9,7,15,8,11,13,12,22,30,10 |
|---|
| 7, 9   8, 15   11, 13   12, 22   10, 30 |
| 7, 8, 9, 15   11, 12, 13, 22   10, 30 |
| 7, 8, 9, 11, 12, 13, 15, 22   10, 30 |
| 7, 8, 9, 10, 11, 12, 13, 15, 22, 30 |

What sorting method was used in above example?
(A) Binary Search (B) Merge Sort (C) Quick Sort (D) Insertion Sort (E) All of the above

4. Three traversals have been defined in **binary search tree** (**BST**): preorder, inorder, and   postorder.   Given   the   following   binary   search   tree:

Which one is **correct**?
(A) Postorder traversal: 1, 2, 7, 5, 12, 24, 22, 25, 21
(B) Preorder traversal: 21, 12, 5, 2, 1, 7, 25, 22, 24
(C) Inorder traversal: 1, 2, 5, 7, 12, 21, 22, 24, 25
(D) All of the above.

5. What is the reason for building a **Distributed System**?
a.Resource sharing
b.Speed up
c.Communication
(A) ab (B) ac (C) bc (D) abc

6. **ebay.com** is a well-known auction site. What type of e-commerce model is it?
(A) B2C (B) C2C (C) B2B (D) O2O (E) None of the above

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7. When you buy mobile phones on ASUS website (**store.asus.com**), what kind of e-commerce model is it used?
(A) B2C (B) C2C (C) B2B (D) O2O (E) None of the above

8. On P2P communication technology, which of the following is **not correct**?
(A) **eMule** is a software that uses P2P (B) **KKBOX** is a software that uses P2P (C) The clients can send data directly to each other (D) It is a **client/server network** (E) None of the above

9. What kind of communication protocol is used in **Web-Based Mail**?
(A) SMTP and POP (B) Telnet (C) HTTP (D) FTP (E) None of the above

10. In **Streaming Media**, which of the following is **not correct**?
(A) Wait for the file to be downloaded before it is played (B) Users can watch audio and video data instantly (C) Send audio and video data to a single point or multi-point: broadcast, unicast, multicast (D) None of the above

11. Convert the following IP address to decimal result:
00100110011000011000011000001000
(A) 166.97.67.1 (B) 38.97.67.8 (C) 38.97.67.1 (D) 38.97.134.8 (E) None of the above

12. In TCP/IP (Transmission Control Protocol/Internet Protocol), which of the following communication protocols **is not** belongs to the application layer?
(A) SMTP (B) FTP (C) DNS (D) TCP (E) None of the above

13. Consider the following declarations and initializations of a **C** program:

int i=10, j=6, *s=&i, *t=&j;

What is the value of 10* (*s / *t) +7

(A) 13 (B) 7 (C) 17 (D) 607 (E) None of the above

14. What is the time complexity (**Big-O**) in following program segment?
```
r=0;
for (i=1; i<M; i++)
    for (j=1; j<i*i; j++)
        if (j%i==0)
            for (k=0; k<j; k++)
                r++;
```
(A) $O(N^5)$ (B) $O(N^4)$ (C) $O(N^2)$ (D) $O(N)$ (E) None of the above

15: What is the result in following program segment?
```
int x[10];
int *p, *q;
p = x+ 1;
q = x + 5;
*(p+1) = 10;
printf("q+p is %d ", q-p);
```
(A) q+p is 0 (B) q+p is 4 (C) q+p is 16 (D) q+p is 15 (E) None of the above

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多選題 (16~26)，一題 5 分，每一選項單獨計分，答錯倒扣

16. n-tree (each node has at most n children) with h height ($n=3$; $h=6$). Which of the following are **correct**?
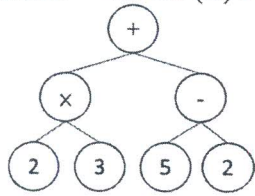
(A) Maximum number of nodes: 364 (B) Minimum number of nodes: 63 (C)

Maximum number of nodes: $\left\lceil \dfrac{n^h}{n-1} \right\rceil$ (D) $\dfrac{2\left\lceil \dfrac{n}{2} \right\rceil^{h-1} - 1}{\left\lceil \dfrac{n}{2} \right\rceil} + 1$ (E) The perfect N-tree (full

and complete) with $\left\lceil \dfrac{n^h}{n-1} \right\rceil$ nodes.

17. Consider the following expressions (2+3)*(5-2), which of the following are **correct**?
(A) Prefix forms: *+23-52 (B) Postfix forms: 23 + 52 - * (C) Inorder form 2+3*5-2 (D)

The tree is: (E) It is a complete binary tree

18. Choose the correct answers from following items regarding **Asymmetric Encryption**.
(A) Both the sender and the receiver have a pair of public and private keys
(B) If the data has been encryption by private key, we must use the corresponding **public key** to decrypt.
(C) If the data has been encryption by public key, we must use the corresponding **private key** to decrypt.
(D) **Both** private key and public key can be made public.
(E) Asymmetric encryption is also called as **Secret Key**.

19. In internet, which of the following are **not correct**.
(A) In **IPv4**, each address has **32 bits**.
(B) In **IPv6**, each address has **64 bits**.
(C) **DNS** is used to address Hyperlink, **DNS** is the address of various resources on the webs.
(D) Some well-known communications protocols FTP、DNS、SMTP、Telnet、HTTP are belong to the **Network Layer**.
(E) Some well-known communications protocols TCP (Transmission Control Protocol) and UDP (User Datagram Protocol) are belong to the **Transport Layer**.

20. Choose the following items that **are correct** regarding **Programming Language**?
(A) C++, Java, C#, and Python are Object-Oriented Paradigm.
(B) The functional paradigm is also called a **procedural paradigm**, some typical programming languages are FORTRAN, BASIC and COBOL.
(C) Windows is designed by Object-Oriented Programming, the main features is that each object **cannot** be reused.
(D) LISP is a **functional paradigm**, program is treated as a combination of several basic functions.
(E) PRPLOG (PROgramming LOGic) is belong to **functional paradigm**, is developed by

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Alain Colmerauer and Philippe Roussel to deal with the natural language.

21. Choose the following items that **are correct** regarding **ADT (Abstract Data Types)**?
(A) A **stack** is a linear list in which data can only be inserted at one end, called the rear.
(B) A **queue** is a restricted **linear list** in which all additions and deletions are made at one end, the top.
(C) A **graph** is an ADT made of a set of nodes, called vertices, and set of lines connecting the vertices, called edges or arcs.
(D) In a **directed graph**, or digraph, each edge, which connects two vertices, has a direction from one vertex to the other.
(E) In **breadth-first traversal** of a binary tree we process all the children of a node before proceeding with the next generation.

22. Choose the following items that **are correct** regarding **Data Structure**?
(A) In **two-dimensional arrays**, the data is organized linearly in **one** direction.
(B) A **record** is a collection of data in which each element contains the location of the next element.
(C) In **linked list**, the last element contains a **null pointer**, indicating the end of the list.
(D) There are two pointers *pre* (for previous) and *cur* (current) in linked list. At the beginning of the search, **both** the *pre* pointier and the *cur* pointer point to the first node.
(E) Before deleting a node in a linked list, we apply the search algorithm. Deletion is simpler than insertion: only two cases, **deleting the first node and deleting any other node**.

23. Choose the following items that **are correct** regarding **CPU scheduling**?
(A) In a time sharing system, the most suitable criterion for CPU scheduling is to maximize the CPU utilization.
(B) A round robin scheduling algorithm should be **preemptive**
(C) If a process is terminated with some exit value in the UNIX operating system, the system call **wait()** in the parent process can be used to obtain the value.
(D) The shortest-job-first algorithm can be implemented for the short-term CPU scheduling.
(E) Processes in the waiting status will wait for the CPU resources

24. Choose the following items that are **not correct** regarding **deadlock**.
(A) In case that there exists a cycle in resource-allocation graph, it will always in deadlock situation.
(B) A computer has 9 tapes drives, with *n* process competing for them. Each process may need at most 3 drives at the same time. **3** is the maximum value of *n* that keeps the system deadlock free.
(C) If there is a cycle of resource allocation graph for a system with single instance resource, it will be in a deadlock state.
(D) If a system is not in the safe state, it will be in a deadlock state.
(E) There are 4 necessary conditions for a deadlock: Mutual Exclusion, Hold & Wait, No Preemption, and Circular Waiting. **It will be deadlock free if one of the above necessary conditions is not established**.

25. Which of the following statements **are correct** regarding **Memory management**
(A) The purpose of timing sharing is to **increase user responsiveness**
(B) Paging avoids the problem of **external fragmentation** of memory in a multi-programming environment.
(C) Compaction could be used to solve problems caused by **internal fragmentation**.
(D) The **physical memory** implements the translation of a program's address space to physical addresses.
(E) When TLB (Translation Lookaside Buffer) **cannot** find the information the CPU is looking for, the OS will be awaken to load the correct TLB in the disc.

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26. Which of the following statements are **correct** regarding **Template**.

(A) Initially, the concept of templates was **not included** in some languages, such as Java.

(B) Templates **allows** functions and classes to operate with generic types.

(C) Templates **does not allows** a function or class to work on many different data types without being rewritten for each one.

(D) The C++ Standard Library provides many useful functions within a framework of connected templates

(E) **Function templates**, **class templates**, and **variable template** are three types of templates.