一、選擇題（單選）35 題，每題 2 分，共 70 分，請在每題的選項內選擇最適當的答案。

注意： 答錯倒扣 1 分，扣至零分為止。（不答不倒扣）

※選擇題部分請作答於電腦答案卡上，並且限用 2B 鉛筆。

1. _____ 10^3 Terabyte (TB) equals (A) 1PB (B) 10^9 GB (C) 1EB (D) 1ZB (E) none of the above.

2. _____ In SQL, which clause is often used to project rows having common values into a smaller set of rows? (A) ORDER BY (B) SORT BY (C) HAVING (D) GROUP BY (E) CLUSTER BY.

3. _____ In relation database, the ____ operator combines the tuples of two relations and removes all duplicate tuples from the result. (A) intersection (B) union (C) sum (D) cartesian product (E) inner join.

4. _____ Which of the following uses gestures as input? (A) Sony PS3 (B) XBOX 360 Kinect (C) Nintendo 3D (D) iPad (E) Wii.

5. _____ Which of the following is a virtual reality application ? (A) Google Moon (B) Google Earth (C) Second Life (D) Plurk (E) all of the above.

6. _____ Which of the following cannot be used as input to a computer system? (A) fingers (B) eye brinks (C) gestures (D) brain waves (E) all of the above can be used as input.

7. _____ Which of the following cannot be considered as a social network site? (A) Facebook (B) Twitter (C) MySpace (D) 無名小站 (E) all of the above belong to social network sites.

8. _____ The area of the hard disk used for virtual memory is called a(n) _____ file because it exchanges data, information, and instructions between memory and storage. (A) exchange (B) VM (C) device (D) swap (E) virtual.

9. _____ Which of the following web sites aims to publish documents alleging government and corporate misconduct, and has recently published previously unavailable documents about the War in Afghanistan and Iraq? (A) WikiNews (B) WikiLeaks (C) WikiSource (D) WikiSecret (E) WikiConfidential .

10. _____ Which of the following cannot be considered as an example of cloud computing? (A) Gmail (B) Amazon Web Services (C) Google Doc (D) online storage (E) all of the above are examples of cloud computing.

11. _____ Which of the following web sites is (are) famous for allowing users to share their photos?

I. Wikiphotos

II. flickr

III. Picasso

IV. Google Groups

(A) All of them (B) I, II, III (C) II, III (D) II, III, IV (E) I, II.

12. _____ Resembling a letter-sized slate, the ____ PC is a special type of notebook computer that allows users to write or draw on the screen. (A) Letter (B) Touch (C) Tablet (D) Matrix (E) Flat Pannel.

13. _____ A ____ is a communications device that connects multiple computers together and transmits data to its correct destination on a network. (A) grid (B) base station (C) Access point (D) router (E) hub.

14. _____ ____ refers to the ability to conduct commerce using a mobile device, such as a mobile phone or PDA. (A) m-commerce (B) v-commerce (C) e-commerce (D) i-Mode (E) Mobile Payments.

15. _____ An encryption scheme where the sender and the receiver share the same key for encoding and decoding the message: (A) asymmetric encryption (B) symmetric encryption (C) common key encryption (D) hash key encryption (E) same key encryption.

16. _____ MD5 and SHA-1 are examples of _____ functions that given an input, produce a virtually unique signature to represent the input. (A) private-key (B) public-key (C) one-to-one (D) hash (E) onto

17. _____ The term _____ is commonly associated with web applications that allow users to participate, collaborate, and generate content. (A) Web 1.0 (B) Web 2.0 (C) Web 3.0 (D) Social Sharing (E) folksonomies.

18. _____ Which of the following is a micro-blogging service that allows users to send updates through short

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messages or links?

   I.　Twitter

   II.　Plurk

   III.　MySpace

   VI.　LinkedIn

   (A) I (B) II (C) I&II (D) I, II & VI (E) I, II, III & VI

19. [　　] A service that utilizes a user's geographical position, often through his mobile devices, e.g., discovering the nearest banking or restaurant: (A) mobile phone tracking (B) telecommunication convergence (C) telecommuting system (D) location-based service (E) local positioning services.

20. [　　] _____ refers to the gap between people with effective access to digital and information technology, and those with very limited or no access at all. (A) Digital Gap (B) Digital Lost (C) Digital Separation (D) Digital divide (E) Digital Hegemony.

21. [　　] In 2002 MIT lunched a project called _____, which aimed to make the course materials that are used in the teaching of almost all MIT's undergraduate and graduate subjects available on the Web, free of charge, to any user anywhere in the world. (A) Virtual Learning Environment (B) MIT WebCast (C) MIT Academy (D) CEIBA (E) OpenCourseWare.

22. [　　] By default, HTTP listens on port (A) 21 (B) 22 (C) 23 (D) 25 (E) none of the above.

23. [　　] A navigation system that consists of one or more earth-based receivers that accept and analyze signals sent by satellites in order to determine the a receiver's geographic location: (A) Global Positioning System (B) Global Satellites System (C) Global Location System (D) Global Geographic Location (E) Global Geographic Network.

24. [　　] _____ refers to authorized person or company that issue and verify digital certificates. (A) CA (B) RA (C) ICRA (D) BSA (E) none of the above.

25. [　　] A specialized graphic that illustrates the interrelationships between entities in a system (or in a database): (A) Class diagram (B) Entity-Object diagram (C) Object-Oriented diagram (D) Entity-Relationship (E) Pert chart.

26. [　　] Which of the following set of standards carries out wireless communication in the 2.4, 3.6 and 5 GHz frequency bands, and is currently the most popular technology used for wireless local area network (WLAN)? (A) IEEE 802.11 (B) IEEE 1394 (C) WiMAX (D) Bluetooth (E) IEEE 802.16.

27. [　　] In the Open Systems Interconnection (OSI) seven-layer communication model, the network layer lies in (A) layer 2 (B) layer 3 (C) layer 4 (D) layer 5 (E) layer 6.

28. [　　] In the Open Systems Interconnection (OSI) seven-layer communication model, _____ provides transparent transfer of data between end users, and controls the reliability of a given link through flow control, segmentation/desegmentation, and error control. (A) layer 2 (B) layer 3 (C) layer 4 (D) layer 5 (E) layer 6.

29. [　　] In algorithms we often use the big-O notation to bound an algorithm's complexity. Which of the following functions is not bounded by $O(n^2)$? (A) $24n^2+12n-5$ (B) $64n \log n$ (C) $n^{1.5}$ (D) $\log (n^3+n^2)$ (E) all of the above are of $O(n^2)$.

30. [　　] The following is a pseudo code for Insertion Sort:

```
1. for j ← 2 to length(A) { // A is an array of elements A[1..N] to sort
2.     key ← A[j]
3.     i ← j−1
4.     while i≧1 and A[i]>key {
5.         A[i+1] ← A[i]
6.         i ← i−1 }
7.     A[i+1] ← key
8. }
```

In the best case, how many comparison operations between the elements of A are needed? (A) $N-1$ (B)

$N+1$ (C) 0 (D) 1 (E) none of the above.

31. [____] Continued from the previous question. In the worst case, how many comparison operations between the elements of A are needed? (A) $O(N \log N)$ (B) $O(N^2)$ (C) $O(N)$ (D) $O(N^3)$ (E) none of the above.

32. [____] Which of the following data structure has the first-in last-out property? (A) heap (B) binary search (C) queue (D) stack (E) none of the above.

33. [____] Which of the following tools in (A-D) is not mainly used in the analysis phase (A) class diagram (B) entity-relationship diagram (C) data flow diagram (D) decision table (E) all of the above are.

34. [____] _____ is a protocol that ensures privacy between communicating applications and their users on the Internet, and is the successor to the Secure Sockets Layer (SSL). (A) Application Layer Security (B) Network Layer Security (C) Transport Layer Security (D) Link Layer Security (E) Connection Layer Security.

35. [____] Which of the following technologies is the key to achieve multi-tasking on a single CPU system? (A) virtual memory (B) pipe lining (C) time sharing (D) micro kernel (E) kernel sharing.

二、問答題（1 題，30 分）

1. Implement the following ADT hash operations tableInsert and tableDelete. The hash function is **modulo** arithmetic and the collection-resolution scheme is **linear probing**. Here, we assume that users never insert duplicated keys into the hash table.

```cpp
const int MAXHASH = 101;  // the maximum size of hash table

struct HashEntry
{
  int status;  // 0 – empty, 1 – occupied, -1 – deleted
  int key;
};

class Hash
{
public:
  ...
private:
  int size;   // size of hash table
  HashEntry table[MAXHASH];
};

// throw a HashException if the insertion is not successful
void Hash::tableInsert(int key) throw (HashException)
{
  ...
}

// throw a HashException if the deletion is not successful
void Hash::tableDelete(int key) throw (HashException)
{
  ...
}
```

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