

一、選擇題（單選）20 題，每題 2.5 分，共 50 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）

請作答於答案卡上，否則不予以計分。

1. Which of the following is not an image file format? (A) JPEG (B) MPEG (C) GIF (D) BMP (E) all of the above are image file formats.
2. Which of the following refers to a small piece of data sent from a website and stored on the user's computer by the user's web browser while the user is browsing so as to remember stateful information? (A) proxy (B) cookie (C) etag (D) http hash (E) cache.
3. How many distinct Internet addresses can IPv6 facilitate? (A) 2^{32} (B) 2^{64} (C) 2^{96} (D) 2^{128} (E) 2^{256}
4. Which of the following (suite of) communication protocols are the foundation protocols used to interconnect network devices on the Internet? (A) TCP/IP (B) UDP/TCP (C) HTTP (D) HTTP/HTTPS (E) DNS.
5. Which of the following is typically not a task of an operating system? (A) CPU scheduling (B) storage management (C) memory allocation (D) I/O management (E) all of the above are common tasks of an operating system.
6. Which of the following is wrong? (A) Linux is open source (B) Linux is Unix-like (C) Android is based on Linux (D) Android is open source (E) all of the above are correct (choose this one only if none of the above can be chosen).
7. Which of the following technologies is best used for tracking objects? (A) smart card (B) beacon (C) RFID (D) NFC (E) IoT.
8. Which of the following technologies is seldom used in autonomous cars to perceive their surroundings? (A) Lidar (B) radar (C) computer vision (D) GPS (E) all of the above are commonly used technologies.
9. Which of the following is an EU regulation on data protection and privacy for all individuals within the EU that replaces the 1995 EU Data Protection Directive and goes into force in May 2018? (A) International Safe Harbor Privacy Principles (B) Digital Millennium Copyright Act (DMCA) (C) Digital Transition Content Security Act (D) General Data Protection Regulation (E) none of the above.
10. Which of the following is not considered as a specific attribute that defines big data? (A) volume (B) velocity (C) variety (D) veracity (E) all of the above are specific attributes that define big data.
11. Which of the following is not an application of big data? (A) Decision making (B) Forecast and Prediction (C) Vulnerability Assessment (D) Government Governance (E) all of the above can be applications of big data.
12. The use of CAPTCHA (which requires user to type the letters of a distorted image, sometimes with the addition of an obscured sequence of letters or digits that appears on the screen) is an example of _____ that is meant to determine whether or not the user is human. (A) Turing Test (B) Alan Test (C) Interactive Test (D) AI Test (E) Awareness Test.

13. Which of the following protocols, as part of X.500, is designed for enabling anyone to locate organizations, individuals, and other resources such as files and devices in a network, whether on the public Internet or on a corporate intranet? (A) Free Directory Access Protocol (FDAP) (B) Internet Directory Access Protocol (IDAP) (C) Lightweight Directory Access Protocol (LDAP) (D) Root Directory Access Protocol (RDAP) (E) none of the above.
14. Which of the following protocols provides a secure channel over an unsecured network in a client-server architecture, and was designed as a replacement for Telnet and for unsecured remote shell protocols such as the Berkeley rlogin and rsh? (A) Secure Shell (SSH) (B) Transport Layer Security (TLS) (C) Secure Sockets Layer (SSL) (D) Session Initiation Protocol (SIP) (E) none of the above.
15. Roughly speaking, the “deep” in “deep learning” neural networks refers to (A) the amount of data being trained (B) the number of tags in input data (C) the fan-in of a node (D) the fan-out of a node (E) none of the above.
16. Which of the following is wrong about deep learning in AI? (A) deep learning requires training data to teach the model how to derive output from input (B) why an output is derived from the input may not be explained from the model (C) for decision making, a biased input may yield a bias output (D) training data usually have human marked information to teach the model what the input are (E) all of the above are correct (choose this one only if none of the above can be chosen).
17. Which of the following is wrong about information security? (A) Spyware is a type of malware designed to steal user data and sensitive information. (B) A Trojan horse is a type of malware that is often disguised as legitimate software so as to mislead users of its true intent. (C) A virus usually refers to a type of malicious programs that are able to actively replicate themselves and spread to other computers. (D) A botnet refers to a network of hijacked zombie computers that are remotely controlled by a hacker. (E) all of the above are correct (choose this one only if none of the above can be chosen).
18. In information security, which of the following terms more commonly refers to psychological manipulation of people into performing actions or divulging confidential information? (A) Phishing (B) Honeytrap (C) Spoofing (D) Social Engineering (E) Psychology Engineering.
19. Which of the following helps protect computers by monitoring and controlling incoming and outgoing network traffic based on predetermined security rules? (A) vulnerability scanner (B) authentication scanner (C) anti-virus software (D) firewall (E) eavesdropping software.
20. Which of the following applications/protocols is typically not based on client-server architecture? (A) network printing (B) remote procedure call (C) emails (D) HTTP (E) all of the above are based on client-server architecture.

二、問答題 2 題，共 50 分。

※ 本大題請於試卷內之「非選擇題作答區」標明題號依序作答。

1. HEAP is a complete binary tree that provides an efficient implementation of priority queues. Suppose we use a heap to manage a list of positive integers that large values mean high priority. The following C++ code fragment shows the class definition of the heap.

(a) (15 points) Write the member function `delete()` that removes the integer in the root of the heap.

(b) (15 points) Write the member function `insert()` that inserts a new integer into the heap.

```
class HEAP
{
public:
    int delete();
        // return and delete the integer in the root of the heap
        // return -1 if there is nothing to delete
    bool insert(int newValue);
        // insert newValue into the heap
        // return false if the insertion is not successful
    ...
private:
    int itemCount; // number of heap items
    int items[100]; // array of heap items
    ...
};
```

2. Double hashing is a popular collision resolution scheme that employs two hash functions to determine the location of an item in a hash table. One hash function computes the starting location of an item and the other one specifies the size of probe step.

(a) (10 points) Explain the benefit of double hashing when resolving collisions.

(b) (5 points) What is the problem if the hash table size and the probe step size are not relatively prime?

(c) (5 points) Suggest a solution to the problem.

試題隨卷繳回