

1. Multiple choices(單選題): (40%)

- (1) What kind of memory does the computer virus not easily hide behind? (a) ROM (b) RAM (c) PROM (d) EPROM (e) none.
- (2) What kind of memory types is used for the MP3/MP4 players (e.g., iPod) to store the songs, the pictures and the movies? (a) PROM (b) Flash memory (c) EPROM (d) ERPROM (e) none.
- (3) A _____ system is a kind of operation systems in which several processes works concurrently. (a) multitasking (b) real-time (c) batch (d) interactive
- (4) What statement is wrong for a computer system? (a) Control unit in CPU is used for instruction decoding (b) BIOS is stored in HD (c) Adding operation is performed in ALU (d) Comparison operation is performed in ALU (e) None.
- (5) In the von Neumann model, the _____ subsystem performs arithmetic and logic operations. (a) ALU (b) input/output (c) memory (d) control unit.
- (6) Which of the following sort algorithms for a list of n entries has the time complexity $O(n \log n)$? (a) Bobble Sort (b) Insertion Sort (c) Merge Sort (d) Selection Sort.
- (7) Which protocol is a protocol for transferring files to a remote server. (a) POP (b) HTTP (c) SMTP (d) FTP.
- (8) Which protocol is not used for email transition? (a) POP3 (b) SMTP (c) IMAP (d) ICMP (e) NONE.
- (9) Which of the following features is for Internet Protocol(IP)? (a) Connection-oriented (b) Provide flow control (c) End-to-end error check (d) Unreliable
- (10) Which component is a connecting device that only regenerates the signal? (a) Repeater (b) Bridge (c) Router (d) Gateway.
- (11) In the hard disk, _____ defines the time to move the read/write head to the desired track where the data are stored. (a) seek time (b) transfer time (c) rotation time (d) response time.
- (12) A _____ is a storage organization in which objects are ordered in first-in, last-out faction. (a) queue (b) stack (c) tree (d) array.
- (13) A _____ is an optical storage device in which the manufacturer burns the data onto the disk. The data cannot be erased. (a) DVD-RAM (b) DVD+RW (c) CD-ROM (d) CD-RW
- (14) A computer has 1GB of memory. Each word is 32 bytes. How many bits are needed to address each single word in memory? (a) 20 bits (b) 24 bits (c) 25 bits (d) 30 bits
- (15) The _____ address uniquely identifies a running application program in Internet. (a) IP (b) domain name (c) network interface (d) socket
- (16) Which switching technique is used for dividing data into different units and then transition in Internet? (a) message switching (b) circuit switching (c) digital switching (d)

- packet switching (e) none.
- (17) If a hard disk space is 200TB, what is its capacity? (a) 200×2^{20} bytes (b) 200×2^{30} bytes (c) 200×2^{40} bytes (d) 200×2^{50} bytes (e) none.
- (18) For a memory chip (16K*32bits), its read cycle time is 10ns. Which is its maximum read speed? (a) 100 M bits/s (b) 800 M bits/s (c) 1600 M bits/s (d) 3200 M bits/s (e) none.
- (19) If the CD/DVD drive model is 8X, it needs 12 minutes for fully writing data to single layer. Then, for the CD/DVD drive model is 12X, how many minutes does it need for the same writing operation? (a) 8 min (b) 10 min (c) 12 min (d) 15 min (e) 16 min.
- (20) In Sony bluray disk (BD), if the data rate is 288 Mbps, it needs 12 minutes for fully writing data to single layer. When two layers are simultaneously written, what is the maximum storing capacity for a BD disk? (a) 400 GB(Giga bytes) (b) 200 GB (c) 100 GB (d) 50GB (e) 25GB.
2. Please explain the concept of “memory hierarchy” and "cache". (6%)
3. Assume 8 bits are used to allocate a signed integer in a computer. Represent the decimal number -86 by following representations. Please show your answer both in binary and hexadecimal notation. (a) 2's complement (b) sign-and-magnitude (c) Excess-100 (6%)
4. Please illustrate and describe the machine cycle for executing an instruction? (6%)
5. Explain why the binary search is faster than the sequential search? (5%) When we will use the sequential search instead of the binary search? (3%)
6. Draw and explain the following topologies of Local Area Networks: Bus, Star and Ring. (6%)
7. Please explain the OSI 7-layer model and briefly describe each layer: (10%)
8. Please spell out CSMA/CD which is used as IEEE std. 802.3 and explain its operation. (10%)
9. An IP address for version 6 is a 128-bit address. (a) Assume that Earth has area with 5×10^{12} square meters in which 70% is ocean. Please calculate how many IP addresses can be assigned to one square meter on the land? (b) In future, if a computer occupies only one square centimeter (cm^2), please calculate how many IP addresses can be assigned to this computer by assuming that all lands in the Earth includes only computers? (8%)