靜宜大學 110 學年度碩博士班暨碩士在職專班招生考試試題

學系：資訊學院　　科目：計算機概論

一、單選題（每一題 2 分，答錯不倒扣）

1. If A = $(10011000)_2$ and B = $(00101101)_2$, which of the following bit patterns is the result of A ⊕ B? (Here ⊕ represents logical operation Exclusive-OR)
   (A) 10111101 (B) 00001000 (C) 10110101 (D) 01100111
2. In the _____ method for synchronizing the operation of the CPU with an I/O device, a large block of data can be passed from an I/O device to memory directly.
   (A) Isolated I/O (B) DMA (C) Interrupt-driven I/O (D) Programmed I/O
3. Considering two 8-bit 2's complement integers operation, which of the following operations will be overflow?
   (A) 00000011+10101010 (B) 01000011–10101111
   (C) 10001111–11111111 (D) 01001111–00000100
4. If A = $(10011000)_2$, B = $(01010100)_2$ and C = A + B, which of the following bit patterns is the result of logic shifting right 3 bits on C? (Here + represents logical operation OR)
   (A) 00000000 (B) 00011001 (C) 00000100 (D) 00011011
5. If a JPEG picture has resolution 1024 × 1024 but without any compression, how many bits are needed to store this picture?
   (A) 16 Mbits (B) 24 Mbits (C) 32 Mbits (D) 48 Mbits
6. A computer uses memory-mapped I/O addressing. The address bus uses 10 lines (10bits). If memory is made of 1000 words, how many four-register controllers can be accessed by this computer?
   (A) 6 (B) 12 (C) 18 (D) 24
7. For the following operations
   1. 11000010 + 00111111 2. 00000010 + 00111111
   3. 01000010 + 01111111 4. 00000010 + 11111111
   Please choose the most suitable answer from the following selections that do not create overflow if the number and the result are represented in 8-bit two's complement notation.
   (A) 1, 2 (B) 1, 2, 4 (C) 2, 3, 4 (D) 1, 2, 3, 4
8. How many bits does the Unicode contain?
   (A) 8 (B) 16 (C) 24 (D) 32
9. Which of the following would be the decimal value of the binary IP address 11001101.11111111.10101010.11001101?
   (A) 205.255.170.205 (B) 109.255.170.109
   (C) 205.127.200.205 (D) 109.127.200.109
10. In the performance of a magnetic disk, the _____ time defines the time to move the read/write head to the desired track where the data is stored.
    (A) Transfer (B) Rotational (C) Seek (D) Move

11. Which of the following features about UNIX is not adequate?
    (A) UNIX is a single user, multiprocessing, portable operating system.
    (B) UNIX is designed to facilitate programming, text processing, and communication.
    (C) UNIX is device-independent.
    (D) UNIX is written mostly in the C language.
12. A computer has 2GB of memory. Each word is 8 bytes. How many bits are needed to address each single word in memory?
    (A) 24 (B) 26 (C) 28 (D) 30
13. The largest positive integer for 8-bit 2's complement representation is _____.
    (A) 127 (B) 128 (C) 255 (D) 256
14. The data in _____ is erased if the computer is powered down.
    (A) RAM (B) ROM (C) A Tape Drive (D) A CD-ROM
15. If a bit pattern represents an unsigned number, a _____operation divides the number by two.
    (A) NOT (B) XOR (C) left-shift (D) right-shift
16. Given a sorted list with 1000000 numbers, by use of binary search, at most k comparisons are needed to find a target. Which one of the following numbers is closest to k?
    (A) 10 (B) 5000 (C) 30 (D) 20
17. What kind of system is expected to do a task within a specific time constraint?
    (A) batch (B) real-time (C) personal (D) email
18. _____ is a concept of memory management, which implies demand paging, demand segmentation, or both, allows part of the program to reside in the main memory and part of it to reside in the disk.
    (A) virtual memory (B) monoprogramming (C) multiprogramming (D) multitasking
19. Which of the following devices makes the communication of network layer of the TCP/IP protocol suite?
    (A) Ethernet card (B) LAN switch (C) Router (D) Modem
20. A process in the ready state goes to the running state when _____.
    (A) It enters memory (B) It requires I/O
    (C) It gets access to the CPU (D) It finishes running
21. A stack is a ___ data structure.
    (A) LIFO (B) LILO (C) FOFI (D) FIFO
22. Which of the following descriptions about trees is correct?
    (A) A tree is a binary tree. (B) The sibling nodes in a tree have a common child.
    (C)Each node in a tree has one subtree at least. (D) There is a unique path between any two nodes in a tree.

23. Which of the following is the largest number of comparisons to elements for the sequential search algorithm in a list of 64 elements?
    (A) 62　(B) 63　(C) 64　(D) 65
24. Which of following data structure is suitable for frequent insertions and deletions?
    (A) 1D-array　(B) record　(C) linked list　(D) 2D-array
25. About traversing a linked list, when the last node has been processed, the walking pointer becomes ____ and the loop terminates.
    (A) 0　(B) -1　(C) FFFF　(D) null
26. If A is the first data element input into a queue, followed by B, C, and D, then _____ is the first element to be removed.
    (A) A　(B) B　(C) C　(D)D
27. Which of the following would be a standard used at the Data Link layer of the Internet or OSI model? (A) IP (B) TCP (C) HTTP (D) Ethernet
28. What is the first step in the bootstrap process?
    (A) Application program runs. (B) Operating system runs.
    (C) Bootstrap program runs. (D) Operating system is loaded.
29. Which of the following items can be an instruction of an algorithm by formal definition?
    (A) If the score is greater than 90, then set grade to 'A'.
    (B) If two vehicles are too close, then automatically break the vehicle.
    (C) If the price is greater than NT$1000, then set price to be reasonable.
    (D) If the product's price is too high on the market, then set price to 0.7*price.
30. On the WWW, every web page, which is a file, has a unique address. The name of this address is
    (A) SMTP (B) URL (C) IP (D) POP

二、填充題（每一空格 2 分。請注意:專有名詞部分請一律用原文全名回答才計分）

1. Convert the number 1011110.01 in binary into the number in octal: _____.
2. An audio signal is sampled 44,100 times per second. Each sample is represented by 65536 different levels. How many bits per second are needed to represent this signal? _____
3. Using a technology called _____, the control unit can do two or three of the phases (*fetch, decode, and execute*) simultaneously, the next instruction can start before the pervious one is finished.
4. If A = $(11011101)_2$ and A XOR mask = 01011011, what is the mask should be? _____
5. The largest positive integer for 16-bit 2's complement representation is _____.
6. In IPv6 (IP version 6), how many bits are used to represent an IP address? _____
7. What is the state of a process in the following situation? The process has finished output and needs the service of the CPU again. _____

8. A computer uses monoprogramming memory management. If the size of memory is 256MB, and the memory resident part of the operating system is 100MB. The maximum size of a program that can be run in the system is _____ MB.
9. Given a list (5, 4, 1, 3, 2, 6), what is the list after 3 passes for bubble sort? _____
10. Given the following algorithm, the return value of F(5) is _____.

```
Algorithm F(n)    {
        if (n=1) return 3;
        else return (2*n+F(n-1));    }
```

三、簡答題（每一題 5 分。請注意: 請詳列計算過程才予計分）

1. The advertised average seek time for a typical disk is 20 ms, the transfer rate is 2 KB/second, the rotation speed is 6000 RPM (rotates per minute).
   (a) What is the average rotation latency for this typical disk? （2 分）
   (b) What is the total time in average to read or write a 512-byte sector? （3 分）
2. Given a 16-bit bit pattern, namely, $a_{15}a_{14}a_{13}a_{12}a_{11}a_{10}a_9a_8a_7a_6a_5a_4a_3a_2a_1a_0$, how to check the number in bit a_{14}? (Hint: Your answer should include the mask, the logical operator, **rotate** operation, and comparison with some number). （5 分）
3. A binary tree has the following traversal results: (inorder traversal: FBGIHADEJC) and (preorder traversal: ABFIGHCEDJ). Please draw this binary tree. （5 分）
4. A multiprogramming operating system uses paging. The available memory is 90 MB divided into 30 frames, each of 3 MB. The first program needs 13 MB. The second program needs 18 MB. The third program needs 28 MB.
   (a) How many frames are used by the first program? （1 分）
   (b) How many frames are used by the second program? （1 分）
   (c) How many frames are used by the third program? （1 分）
   (d) How many frames are unused? （1 分）
   (e) What is the total wasted memory (in MB) （1 分）
   (hint: the unused memory inside each allocated frame)?