國 立 宜 蘭 大 學

１０３學年度研究所碩士班考試入學

計算機概論試題

（資訊工程學系碩士班）

准考證號碼：

《作答注意事項》

1.請先檢查准考證號碼、座位號碼及答案卷號碼是否相符。

2.考試時間：100 分鐘。

3.本試卷共有 5 大題，總分共計 100 分。

4.請將答案寫在答案卷上。

5.考試中禁止使用大哥大或其他通信設備。

6.考試後，請將試題卷及答案卷一併繳交。

7.本試卷採雙面影印，請勿漏答。

8.應試時不得使用電子計算機。

1. Single-choice questions (60 points total). Each correct answer is worth 2 points.

(1). Which one of the following elements connects to the machine's environment?
   (A) Memory Manager
   (B) CPU Scheduler
   (C) Dispatcher
   (D) Device Driver

(2). If a machine with 9-bit addresses is **word** (i.e., 32 bits) addressable, how many **bytes** can the machine have?
   (A) 512
   (B) 1024
   (C) 2048
   (D) 4096

(3). Which of the following interface is **Printer Port**?
   (A) Parallel Port
   (B) Serial Port
   (C) IEEE 1394
   (D) SATA interface

(4). Which of the following protocol resides in the **network layer** of the OSI 7-layer.
   (A) IPv6
   (B) TCP
   (C) UDP
   (D) HTTP

(5). Given two signals 11110000 and 10001000. What is the result after **AND** operation?
   (A) 10000000
   (B) 11110000
   (C) 10001000
   (D) 10011001

(6). What is the **Decimal** value of $(11011110)_2$?
   (A) 221
   (B) 222
   (C) 223
   (D) 212

(7). Which of the following device is used to connect different **subnet**?

    (A) L2 Switch

    (B) Hub

    (C) Router

    (D) Bridge

(8). Which of the following device is used to filter the **Layer-4** network traffic?

    (A) L2 Switch

    (B) Gateway

    (C) Router

    (D) Bridge

(9). Which of the following protocol is used for VoIP (Voice over IP) **signaling**?

    (A) H.264

    (B) G.711

    (C) RTP

    (D) SIP

(10). Which of the following protocol is used for **securely** transmission of VoIP **media**?

    (A) SDP

    (B) RTP

    (C) RTCP

    (D) SRTP

(11). Which of the following protocol can provide **reliable** communication?

    (A) TCP

    (B) UDP

    (C) IPv4

    (D) IPv6

(12). Which of the following protocol can provide **real-time** communication?

    (A) TCP

    (B) UDP

    (C) IPv4

    (D) IPv6

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(13). Which of the following description is **incorrect**?

(A) 1MB = 1024KB

(B) 1KB < 1GB

(C) 1KB = 1024B

(D) 1GB = 1024KB

(14). Which of the following is **NOT** a multi-user operating system?

(A) MS-DOS

(B) LiNUX

(C) Windows XP

(D) Windows 7

(15). What is the **binary** values of $(45)_{10}$?

(A) 111100

(B) 101101

(C) 110110

(D) 101111

(16). What is the **2's Complement** of $(10001)_2$?

(A) 01110

(B) 01111

(C) 01101

(D) 01010

(17). Which of the following standard belongs to **wireless PAN** (Personal Area Network)?

(A) IEEE 802.11

(B) IEEE 802.3

(C) IEEE 802.15

(D) IEEE 802.21

(18). Which of the following standard belongs to **wireless LAN** (Local Area Network)?

(A) IEEE 802.3

(B) IEEE 802.11

(C) IEEE 802.15

(D) IEEE 802.16

(19). Which of the following is the **4G** technology which is identified by ITU-T?

    (A) LET

    (B) IEEE802.16m

    (C) 3GPP

    (D) 3GPP2

(20). Which of the following codec can support **video** encoding/decoding?

    (A) H.323

    (B) H.264

    (C) G.711

    (D) G.729

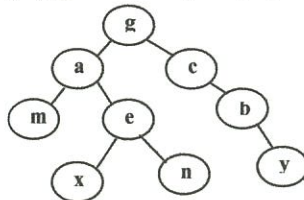(21). Give a Java recursive function fcount() as follows:

```
int fcount( int n )
{
    if(n==0) { return(1); } else if(n==1) { return(2); }
    else { return( 2*fcount(n-1)+fcount(n-3) ); }
}
```

fcount(5) = ?

(A) 32   (B) 33   (C) 34   (D) None of the above

(22). Give the binary tree as follows. What is the preorder sequences of this tree?

    (A) mxneaybcg   (B) gamexncby   (C) maxengbyc   (D) None of the above

(23). Which file format of follows could not represent true color (24bits) image?

    (A) png   (B) gif   (C) jpg   (D) bmp

(24). Which of following sorting algorithms can sort n data in $O(n \log n)$ normal or better case time, but in $O(n^2)$ worst case time?

   (A) heap sort   (B) merge sort   (C) quick sort   (D) insertion sort

(25). Let for variable w, x, y, z are 1,2,3,4 respectively. Please answer the result of the post-order expression "wxy*-z+" ?

    (A) -2   (B) 3   (C) 1   (D) -1

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(26). A divide-and-conquer algorithm typically makes use of

(A) recursion (B) iteration by looping (C) hashing   (D) queueing

(27). Let us build a max-heap tree with the list of values (10, 9, 20, 8, 15, 12, 17).   What would be the order of the values of the first max-heap tree?

Exp:

max-heap tree

order of the values

1	2	3	4	5	6	7
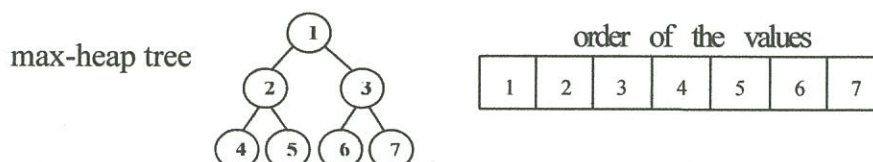
(A) 10,20,9,8,17,12,15 (B) 20,10,17,9,8,12,15
(C) 10,9,8,20,15,12,17 (D) 20,17,10,9,8,15,12

(28). Which of the following is not correct:

(A) Java is a multi-inheritance object oriented language

(B) JavaScript is an interpreted language

(C) C++ is a multi-inheritance object oriented language

(D) Java applet can plug in many kinds of web browser

(29). The following addition is performed in base r: (27)r + (141)r = (223)r.   The r is which of the following? (A) 4   (B) 5   (C) 6   (D) 7

(30). Which of the following is not correct:

(A) For the minimum spanning tree problem, Kruskal's algorithm is a greedy   method.

(B) A flash-based SSD (solid-state disk) can only be erased (and therefore written) a limited number of times before it fails

(C) Boolean expression ab+~ac+bc is equal to ab+a'c. (ps: ~a is "not a")

(D) If a problem is said to be NP-complete, it actually refer to that the problem can not be solved in polynomial time.

Answer the following questions (40 points total)

2. Assume a CPU only have four registers A, B, C and D. The assembler instructions of this CPU are shown as follows:

```
move    #n, reg-1       /* constant  n   ->   reg-1 */
move    reg-1,reg-2      /* reg-1   ->   reg-2 */
add  reg-1,reg-2,reg-3   /* reg-1 + reg-2   -> reg-3 */
sub  reg-1,reg-2,reg-3   /* reg-1 - reg-2   -> reg-3 */
mul  reg-1,reg-2,reg-3   /* reg-1 * reg-2   -> reg-3 */
```

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for example:　　　move #2, A /* put a constant number 2 to the register A. */

move #5, B /* put a constant number 5 to the register B. */

add A,B,C　　/* let the value of A plus the value of B

and put the result to C. */

In this example, the value of C is 7 finally.

Please design an assembly program to calculate the expression and put the final result to register D. (10 Points)　　　expression:　(34+23)*56-42+7*28

3. The following traversals unambiguously define a binary tree. Please rebuild the binary tree and show it's preorder traversal? (8 Points)

inorder traversal: DBGEHAFC　　　　postorder traversal: DGHEBFCA

4. Design a program function int GCD (int a, int b) to compute the greatest common divisor of variables a and b. (8 Points) And then design a program function　int LCM(int a, int b) to compute the least common multiple of variables a and b. (you can use Java or C language) (4 Points)

5. Describe the functionalities of the **physical layer**, **data-link layer**, **network layer**, **transport layer** and **application layer** of OSI 7-layer model. (10 Points)