

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

(電子工程學系碩士班)

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

- (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:

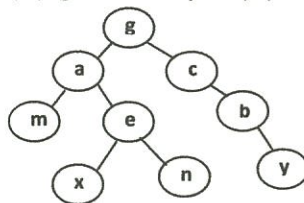
```
int fcount( int n )  
{  
    if(n==0) { return(1); } else if(n==1) { return(2); }  
    else { return( 2*fcount(n-1)+fcount(n-3) ); }  
}
```

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

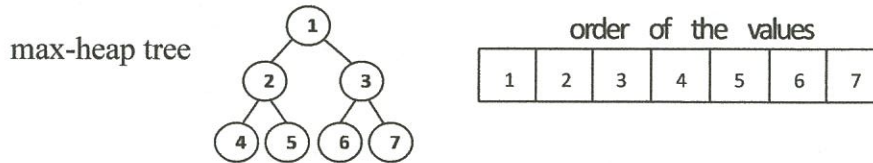
(25). Let for variable w, x, y, z are 1,2,3,4 respectively. Please answer the result of the post-order expression "wxy*-z+" ?

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

(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:



- (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 $ab + \sim ac + bc$ is equal to $ab + a'c$. (ps: $\sim a$ 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 */
    
```

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)