系所組別：交通管理科學系丙組

考試科目：計算機概論　　　　　　　　　　　　　　　　　考試日期：0212，節次：3

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※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

I.　Choose the best answer：(30%, 2% for each, no deduction on wrong answer)

1. What is the minimum number of required bits to store the number 100,000?　(A) 15　(B) 16　(C) 17　(D) 18　(E) 19.

2. An audio signal is sampled 8000 times per second. Each sample is represented by 256 different levels. How many bits per second are needed to represent this signal?　(A) 16K,　(B) 32K,　(C) 64K,　(D) 128K,　(E) 256K.

3. Sort the speed sequence from the fastest to the slowest of the following memory. [a] cache memory,　[b] main memory,　[c] auxiliary memory,　[d] register . (A) abcd,　(B) abdc,　(C) badc,　(D) dabc,　(E) dbac.

4. What is the maximum node number in a binary tree with its height is 6 ?

　(A) 31,　(B) 32,　(C) 63,　(D) 64,　(E) 128.

5. An imaginary computer has 16 data registers (R0 to R15), 1024 words in memory, and 16 different instructions (add, subtract, and so on). What is the minimum size of an add instruction uses the following format: *add M R2*　(A) 12　(B) 16　(C)　18　(D) 20　(E)　22.

6.　As above. What is the size of the program counter in the computer?　(A) 10　(B) 8　(C) 16　(D) 18　(E) 20.

7.　As above. What is the minimum size of control bus in the computer?　(A) 4　(B) 8　(C) 10　(D) 12　(E) 16.

8. Which one of the following compression is LOSSY compression method?

　(A) run-length encoding,　(B) JPEG,　(C) Huffman coding,　(D) Lempel Ziv,　(E) none of the above.

9. What is the value of expression (8 * 9 / 6 % 5 * 4)?　(A) 5,　(B)　6,　(C) 7,　(D) 8,　(E) 9 .

10. Assume Bob, using the RSA cryptosystem, selects p=11, q=13, and d=7, which of the following can be the value of public key e ?　(A) 11,　(B) 103,　(C) 19,　(D) 77,　(E) 31.

11. Which layer of the TCP/IP protocol suit is responsible for "creating user datagram" ?

　(A)　Physical layer,　(B)　Data-link layer,　(C) Network layer,　(D) Transport Layer,　(E) Application Layer .

12. As above, which layer of the TCP/IP protocol suit is responsible for "connection to transmission media" ?

13. Which one is **not** the key concept in dynamic programming?　(A) recurrence relation,　(B) tabular computation,　(C) recursive tree,　(D) traceback,　(E) none of the above.

14. Which one about the von-Neumann model is **not** correct?　　(A) stored program concept,　　(B) it's a general computer architecture,　　(C) four major units including: CU, ALU, I/O, and memory,　　(D) program and data use the same memory space,　　(E) none of the above.

15. Find the root of the following binary trees: [1] Tree with postorder traversal: FCBDG ,　[2] Tree with preorder traversal: IBCDFEN,　[3] Tree with postorder traversal: CBIDFGE

　　(A) G,I,E,　(B) F,N,E,　(C) F,I,E　(D) G,D,C　(E) G,I,C.

II、Short-answer questions：（70%）

1. Please briefly explain the following terminologies. <25%>

　　(A) Black box testing,　(B) Message authentication code (MAC),　(C) Bootstrap program,

　　(D) Vehicle Ad Hoc Network,　(E) Entity-relationship model

2. A binary tree has ten nodes. The inorder and preorder traversal of the tree follows:

　　Preorder: "JCBADEFIGH"　　　Inorder: "ABCEDFJGIH"

　　Please draw the tree. <6%>

3. Encode the message BAABBBBAACAA using the Lempel Ziv method <6%> ,

　　then decode the encoded message to get the original message. <6%>

4. Write a code fragment using a "for loop" that never stops.　<7%>

5. Write a recursive algorithm in pseudocode to find the greatest common divisor (GCD) of two integers using the definition as follows. (Note: 'x mod y' means dividing x by y and using the remainder as result of the operation) <10%>

$$GCD(x, y) = \begin{cases} x, & if\ y = 0 \\ GCD(y, x\ mod\ y), & otherwise \end{cases}$$

6. Show the process and result of the floating-point operation using IEEE_127 : <10%>

　　$-344.3125 - 123.5625$