國立雲林科技大學
九十一學年度研究所碩士班入學考試試題

系所：設計運算所

科目：計算機概論（甲）

說明：本試題共有六大題，請依序並標明題號，詳答於答案卷上，可以不用抄題。

壹、解釋名詞：(30%，各佔 3%)

(1) Hypertext
(2) Indexed Color
(3) User Interface
(4) Virtual Reality
(5) MIDI Equipments
(6) RAM
(7) LAN
(8) Record
(9) Client-Server
(10) IP

貳、請完成下列各不同數值的基底轉換：(15%，各佔 3%)

(1) 將 ABC_{16} 化成十進位數（Decimal）
(2) 將 316_8 化成二進位數（Binary）
(3) 將 0.35_8 化成十進位數（Decimal）
(4) 將 4659_{10} 化成八進位數（Octal）
(5) 將 $1101011111011000 11_2$ 化成十六進位數（Hexadecimal）

參、Photoshop 軟體（software）的執行檔為以編譯器（Compiler）處理而產生；目前網頁上呈現的訊息則以直譯器（Interpreter）的處理為主。請你說明 Compiler 與 Interpreter 的差異。（10%）

肆、系統開發生命週期（SDLC）有那幾個階段的重要工作？請簡述其各階段的主要作業內容（10%）。

伍、試說明關連式資料庫的正規化（Normalization）概念及正規格式（Normal Form）？（20%）

陸、請說明專家系統至少應具備的功能有那些？（15%）

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科目：設計理論

注意：1.不必抄題，但答題順序不得顛倒，否則不予計分。
2.繳卷時，「試題」「試卷」一併繳回。

1. 自 1851 年開始 Joseph Paxton 在倫敦世界博覽會設計水晶宮後，開啟現代設計新的里程碑。試舉出自 1851 年迄今，在設計史上三個頗具影響現代設計發展的運動或派別，並說明每一運動或派別的發展原因、風格特色及其對設計的影響。(30%)

2. 自網際網路(Internet)開始發展以來，其對人類在資訊科技的影響大且深遠，試就網際網路對設計產業的影響與幫助，舉一例具體說明之。(20%)

3. 從事設計時，必須考量的因素很多，而每種設計因素在每一設計個案中，所佔的比重亦有所不同，試以「網頁設計」的觀點，就「機能因素、美感因素、技術因素、社會與文化因素」等，分析各個因素的比重，以及所要考量的重點。(30%)

4. 我們在觀看「星座」時，會利用到某些「完形的法則」，試將所用到的法則加以圖解說明之。(20%)

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科目：計算機概論 (乙)

1. (4%) If the working frequency of one CPU is 60 MHz. And each instruction spends averagely 3 clocks cycle. What does the performance of this CPU (please use MIPS representation)?
2. (4%) The representation of a single precision floating-point numbers in IEEE 754 standard contains one sign bit s, 23 significand bits, and 8 exponent bits E, and takes the value of

$$(-1)^s * (1 + significant) * 2^{(E-127)}$$

s	exponent	significant

What is the decimal value of the following representation

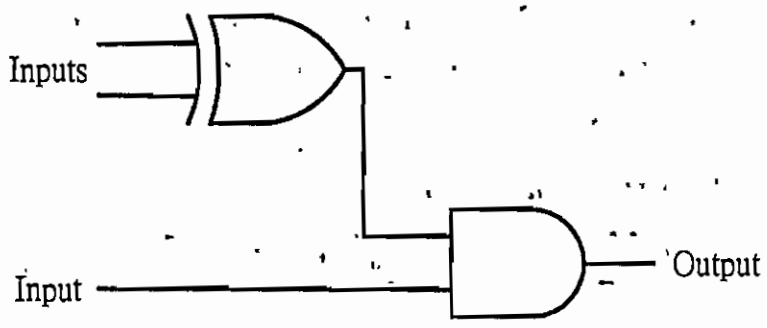
11000000011000000000000000000000?

3. (10%) The values from 0x41 to 0x5A are the ASCII code values of the characters from A to Z. Please write down the results of the following program?

```
main( )
{
      int a,b,c;
      float u;
      long i;
      char ch;
      a=16; b=4; c=2; ch='A';
      a = a >> 2 + 3 * b % 5;
      printf(" out1 = %d   \n", a);
      printf(" out2 = %c   \n", c+ch);
      printf(" out3 = %c   \n", (b>c)?ch+b:ch+c);
      printf(" out4 = %d   \n", ~b);
      printf(" out5 = %d   \n", sizeof(a)+sizeof(u)+sizeof(i)+sizeof(ch));
 }
```

4. (12%) How many address lines would the following sizes of the memories required? Assume that the access unit is byte.
   (a) 8K bytes (b) 64K bytes (c) 100K bytes (d) 12M bytes
5. (10%) Please transfer the infix expression "A/B^C-(D*E-A*C)" into prefix and postfix expressions.
6. (10%) In the local area network, when we use personal computer with Windows 98 operation system to connect to Internet. Please explain the following terms: IP address, DNS, Proxy, Netmask, and Gateway.
7. (10%) There is 1 binary tree with 1 node, 2 binary trees with 2 nodes, 5 binary trees with 3 nodes. How many binary trees are there with 5 nodes?

8. (10%) What input bit patterns will cause the following circuit to produce an output of 1?

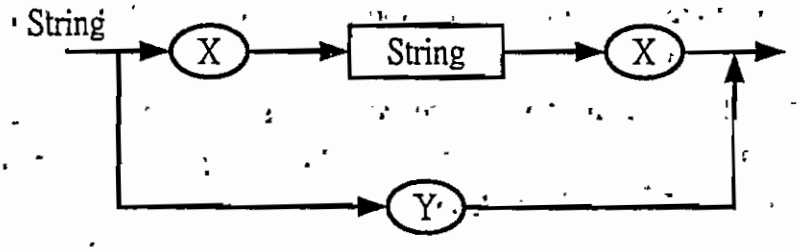


9. (10%) Show how the uncontrolled interweaving of two transactions, one of which deducts $100 from an account and the other which deducts $200 from the same account, could produce final balances of $100, $200, and $300, assuming that the initial balance is $400.

10. (10%) Using a breadth-first approach, draw the search tree that is constructed by a control system when solving the eight-puzzle from the following start state:

1	2	3
4	8	5
7	6	

11. (10%) Describe the syntax of a string as defined by the syntax diagram below and draw the parse tree for the string XXYXX



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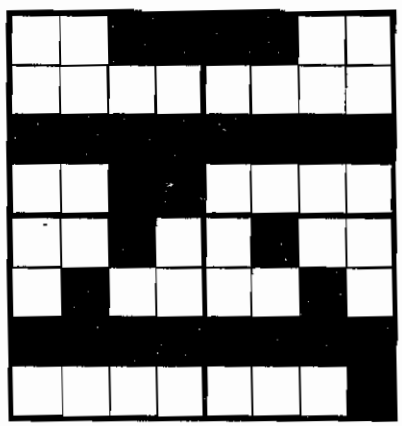
科目：資料結構

1. (10 points) Write an algorithm to rewrite an infix expression of tokens as a postfix expression. Write another algorithm to evaluate the postfix expression of tokens. Consider the example expression "69-(25+20)/15" with the tokens "69", "-", "(", "25", "+", "20", ")", "/", and "15". Use this example to illustrate your algorithms. What is the time complexity of each of your algorithms?
2. (10 points) Write a QuickSort algorithm to sort a list of numbers. Illustrate your algorithm with the sample list 23, 4, 11, 28, 1, 8, 16, 7, 21, 19. What is the time complexity of your algorithm?
3. (15 points) Write a depth-first search algorithm and a breadth-first algorithm to search a graph for a target. Illustrate your algorithms with an example. Compare the two algorithms in as many ways as you can.
4. (15 points) What is a binary search tree? Write an algorithm to insert an element into a binary search tree. Write an algorithm to delete an element from a binary search tree. Illustrate your algorithms by starting with a null tree and inserting 2, 5, 30, 40, 80, and 50 in this order, and then deleting 30.

5. (15 points) 試以四分樹(Quadtree)資料結構方式，來表示下列這張 8×8 的影像(白色爲 0，黑色爲 1)，並將該四分樹畫出。



6. (10 points)某個二元樹其前序爲 ABCDEFGH，中序爲 CBAEFDHG，請畫出這棵二元樹。

7. (10 points)後序式 6 2 3 * / 4 * 5 + 的值爲何？

8. (15 points)將 15, 5, 40, 25, 26 依序插入一個空的 3 階 B-tree 中，然後刪除 5，結果爲何？請將 B-tree 畫出。

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系所：設計運算所
科目：離散數學

1. (15 points) File data are commonly compressed as variable-length, binary-character codes in order to save disk space. Huffman coding produces a prefix code with variable length---no codeword is also a prefix of some other codeword. Write an algorithm to do Huffman coding. Illustrate your algorithm with the sample inputs: z, y, w, v, x, u, with respective occurrence frequencies 5, 9, 12, 13, 16, 45.
2. (15 points) Consider the argument

$\neg p \leftrightarrow q$

$q \rightarrow r$

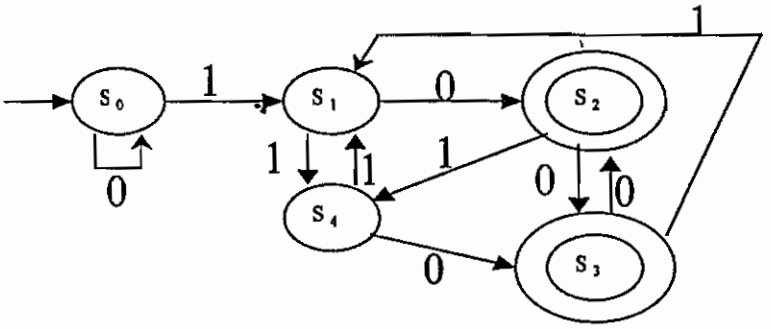
$\neg r$

– – – – –

$\therefore p$

Establish the validity of the argument using common rules of inferences.

3. (10 points) Prove that $\sqrt{3}$ is an irrational number.
4. (10 points) Write a QuickSort algorithm to sort a list of numbers. Illustrate your algorithm with the sample list 23, 4, 11, 28, 1, 8, 16, 7, 21, 19. What is the time complexity of your algorithm?
5. (10 Points) Find the 0-equivalence classes and 1-equivalence classes for the automaton shown below.



6. (10 Points) Prove that every connected graph has a spanning tree.
7. (10 Points) If f:X→Y and g:Y→Z are functions and $g \circ f$:X→Z is one-to one, must both f and g be one-to-one ? Prove or give a counterexample.
8. (10 Points) Support d is a fixed constant and $a_0, a_1, a_2, \ldots$ is a sequence that satisfies the recurrence relation $a_k = a_{k-1} + d$, for all integers $k \geq 1$. Use mathematical induction to prove that $a_n = a_0 + n \cdot d$, for all integers $n \geq 0$.
9. (10 Points) design a circuit to take inputs signals P, Q, and R and output a 1 if, and only if , all three of P, Q, and R have the same value.