國立臺中教育大學96學年度大學日間部轉學招生考試

計算機概論試題

適用學系:資訊科學學系、數位內容科技學系

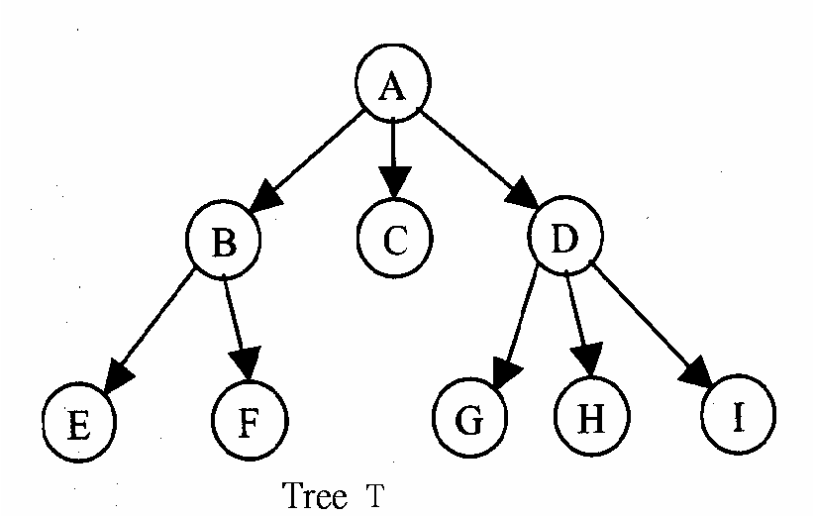
一、選擇題（60%，每題2%）

1. 147相當於十六進位的 （A）93（B）A3（C）53（D）D3
2. 以下何者符合偶同位編碼?
   (A)11010011（B）10011101（C）01101001（D)01010010
3. 00100110的1補數為（A)11010001(B)11011001(C)11100011(D)11101101
4. 路由器是哪一層網路的裝置
   (A）應用層（B）傳輸層（C）網路層（D）資料鏈結層
5. 磁碟上最小的定址單位是（A）磁區（B）磁軌（C）磁柱（D）磁芯
6. 01010100 NOR 01001110 =
   (A）11001101（B）10011011（C）10100001（D）01000100
7. x, y, z 為布林變數， xy+x’z+yz=
   (A）xy + y’z（B）xy + x’z（C)yz+ y’x（D）yz+xz’
8. 光碟算是一種 （A）隨機存取記憶體 （B）直接存取記憶體
   （C）循序祷取記憶體 （D）以上皆非
9. MFLOPS 是 （A）每秒百萬赫茲（B）每秒百萬指令
   (C)每秒百萬浮點數（D）每秒百萬位元
10. 簡體字的內碼目前一般是使用
    (A）王安碼（B）GB碼（C）Big5碼（D）零壹碼
11. 下列何者為 $(05181)_{10}$ 九的補數?
    (A) 94819 (B) 94818 (C) 94817 (D) 94816
12. ISO/OSI的七層模型中，負責決定傳輸路徑的是哪一層?
    (A)實體層 (B)應用層 (C)傳輸層 (D)網路層
13. 一個高度為10的二元數(Binary Tree)，最多可有幾個節點(Node)?
    (A)1023 (B)1024 (C)2047 (D)2048
14. IPv6的位址長度為多少? (A)64Bits (B)128Bits (C)256Bits (D)1024Bits
15. 下列硬體元件中，何者的速度是最快的?
    (A)RAM (B)Cache (C)Register (D)Flash disk
16. 下列何者為十進制 26.78125 轉成二進制的數
    (A)11001.101001 (B)11010.11001 (C)11001.110001 (D)11010.10101

17. 在邏輯運算中，只有在兩個運算元之值相異時，其結果才為真值的是下列哪一種運算？ (A)OR 運算 (B)AND 運算 (C)NOR 運算 (D)XOR 運算
18. 試計算邏輯運算 (A+B) + (A'・B') 的結果。 (A)0 (B)1 (C)-1 (D)不一定
19. 物件導向技術中的三大特性為何？
    (A)封裝(encapsulation)、繼承(inheritance)、類別(class)
    (B)封裝(encapsulation)、繼承(inheritance)、多元性(polymorphism)
    (C)繼承(inheritance)、類別(class)、封裝(encapsulation)
    (D)類別(class)，繼承(inheritance)，多元性(polymorphism)
20. 電腦網路進行資料傳送時，常將資料分割成一小塊一小塊傳送出去，此一小塊資料如何稱呼？ (A)位元 (B)訊息 (C)封包 (D)資訊
21. The process of searching for a special pattern of symbols within a larger collection of information is called _____. (A) sequential search (B) dynamic processing (C) pattern matching (D) pattern search.
22. UNICODE encodes a total of _____ different characters.
    (A) 64 (B) 256 (C) 512 (D) 65,536.
23. The functional unit of a computer that stores and retrieves the instructions and the data being executed is called the _____.
    (A) control unit (B) I/O controller (C) memory (D) cache.
24. Assemblers usually make _____ pass(es) over the source code.
    (A) one (B) two (C) three (D) four.
25. The process of associating a symbolic name with a physical memory address is called _____. (A) synchronizing (B) validating (C) binding (D) registering.
26. Which of the following layer of the TCP/IP protocol hierarchy handles framing?
    (A) data link (B) physical (C) network (D) application.
27. _____ programs consist of facts and rules.
    (A) Ada (B) Prolog (C) C++ (D) Scheme.
28. During the _____ phase, the sequence of tokens formed by the scanner is checked to see whether it is syntactically correct according to the rules of the programming language. (A) lexical analysis (B) parsing (C) code optimization (D) semantic analysis and code generation.
29. Which of the following statements about the halting problem is correct?
    (A) It is a computable problem.
    (B) No Turing machine exists to solve this problem.
    (C) A Turing machine exists that solves the problem.
    (D) If it cannot be done by a Turing machine, it is still computable.
30. _____ is the process of verifying the identity of the receiver of your message.
    (A) Spoofing (B) Authentication (C) SSL (D) Encryption.

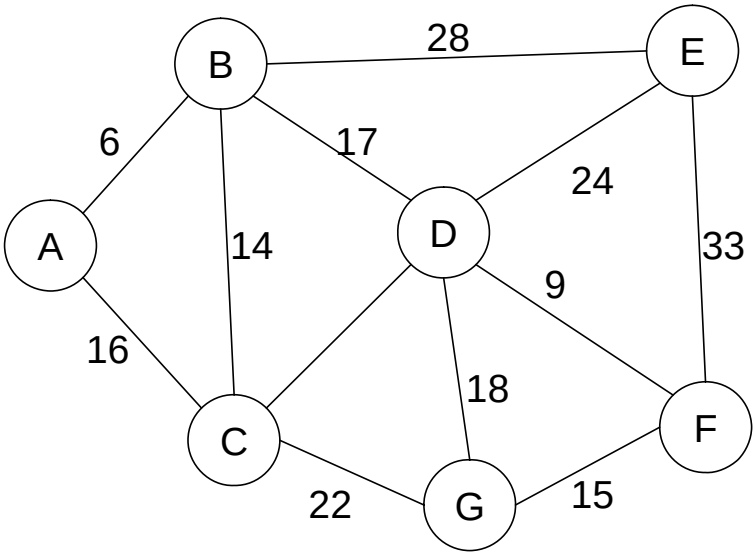
二、問答題（40%，每題 10%）

1. 已知 10 個位元的序列 1010011110 和除數 1011，請找出 CRC 並核對答案。
2. 收到 11110101101，請使用漢明碼(hamming code)演算法，找出原來傳送的資料。
3. Please transfer the following **tree T** to a **binary tree T'** and let the tree T and tree T' have the same traversal order.



Tree T

4. Given an undirected connected **Graphic G** with n nodes and its edge set E. Each edge has a cost value. Please use Prim's algorithm to construct the minimum cost spanning tree step by step.



Graphic G

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離散數學試題

適用學系：資訊科學學系

問答題（100%，每題 10%）

1. Show that if five integers are selected from the first eight positive integers, there must be a pair of these integers with a sum equal to 9.

2. A *palindrome* is a string whose reversal is identical to the string. For example, 101 and 1001 are *palindromes*.

   (a) How many *binary* strings of length 9 are palindromes?

   (b) How many *binary* strings of length 10 are palindromes?

3. Solve the equations (a) $\sum_{k=0}^{n}\binom{n}{k}$ (b) $\sum_{k=0}^{n}(-1)^k\binom{n}{k}$

4. Assume there are only 365 birthdays (i.e., no February 29).

   (a) In a set of k people chosen at random, what is the probability that 2 or more of them have the same birthday? (7%)

   (b) For 2 randomly chosen people, what is the probability that they have the same birthday? (3%)

5. Let $\oplus$ and $\odot$ be two operations defined on $Z_{14} = \{0, 1, 2, 3, \ldots, 13\}$ such that $a \oplus b = (a + b \bmod 14)$ and $a \odot b = (a \cdot b \bmod 14)$. Is the algebraic system $(Z_{14}, \oplus, \odot)$ a *Ring*? Justify your answer.

6. Let N denote the set of all natural numbers. Given the relation $R = \{(a, b) \mid a, b \in N$ and a divides $b\}$, please prove that R is a partial order relation.

7. Let *A* be a set with six distinct elements. (a) How many different binary relation on *A* are there? (b) How many of them are total ordering relation?

8. Find a minimum cost spanning tree of the graph shown in Figure 1. Also, write down its cost.

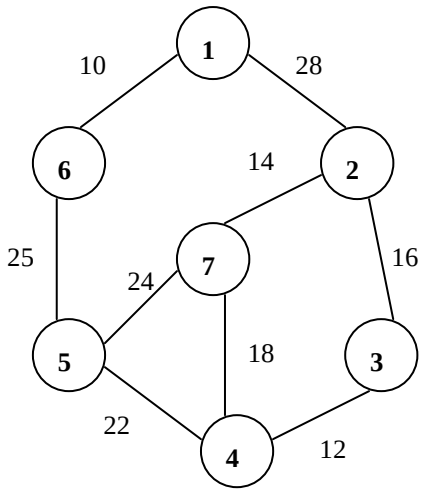

Figure 1

9. Please write down the *Adjacency Matrix* and the *Linked Adjacency List* of the graph shown in Figure 2.

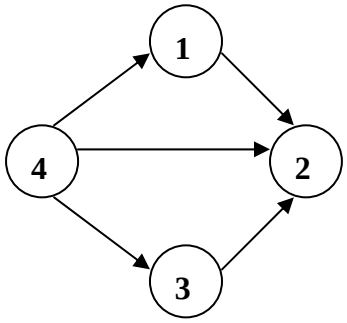

Figure 2

10. C = {00000, 01111, 10101, 11010} is a group code of B^5 and it is *d*-error correcting code. Please write down the minimum distance of this code and the value of *d*.