I. Multiple Choice – 單選題 (**40 points; 2 points/question**)

_____ 1. Compressing files will not reduce a disk ___?
(A) storage capacity (B) data transfer rate (C) access time (D) all of above

_____ 2. A memory unit is organized as a 8,192 x 1,024 two dimensional array. What is the size of MAR?
(A) 21 bits (B) 22 bits (C) 23 bits (D) 24 bits

_____ 3. Which program uses POP3? (A) NotePad (B) Illustrator (C) Photoshop (D) Windows Mail

_____ 4. Which of the following technique can increase their instruction throughput?
(A) pipeline (B) cache (C) SOC (D) none of the above

_____ 5. What is the size for 4 minutes song sampled 10,000 times per second with the bit depth of 16?
(A) 32×10^5 Bytes (B) 24×10^5 Bytes (C) 48×10^5 Bytes (D) none of the above

_____ 6. Convert 12.375_{10} to its binary representation. (A) 1100.011 (B) 1100.101 (C) 1010.011 (D) 1010.101

_____ 7. Convert 123_{10} to its hexadecimal representation. (A) 79_{16} (B) $7A_{16}$ (C) $7B_{16}$ (D) $7C_{16}$

_____ 8. BIOS is usually stored in ___.   (A) RAM (B) cache (C) ROM (D) hard disk

_____ 9. In a machine language instruction operation code takes 8 bits. What is the maximum number of distinct operation codes that can be recognized and executed by the processor on this machine?
(A) 8 (B) 16 (C) 128 (D) 256

_____ 10. The system boots from _____. (A) MBR (B) FAT (C) root folder (D) sector

_____ 11. The _____ is used to fetch, decode, and execute instructions.
(A) arithmetic/logic unit (ALU) (B) I/O controllers (C) memory (D) control unit

_____ 12. Which is used to locate a memory location? (A) decoder (B) multiplexor (C) cache (D) IR

_____ 13. _____ is a freeware operating system. (A) Vista (B) Linux (C) Palm OS (D) Mac OS

_____ 14. In the _____ topology, all nodes connected to a single shared communication line.
(A) star (B) bus (C) ring (D) helix

_____ 15. The _____ of a disk is the time for the beginning of the desired sector to rotate under the read/write head.
(A) latency (B) transfer time (C) frequency (D) seek time

_____ 16. Which is a language for defining markup languages?
(A) HTML (B) HTTP (C) XSLT (D) XML

_____ 17. _____ is a huge interconnected "network of networks".   (A) WAN (B) LAN (C) WWW (D) Internet

_____ 18. The _____ layer protocol provides end-to-end connections.
(A) application (B) data link (C) transport (D) physical

_____ 19. Asymmetric DSL lines usually provide _____ upload bandwidth than download.
(A) greater (B) more reliable (C) less (D) less reliable

_____ 20. A Web client and server communicate through ___. (A) DNS (B) SMTP (C) HTTP (D) FTP

II. Questions and Answers – 問答題 (**60 points**)

1. (10%) 寫出下列程式執行的結果。
   (1) (4%)
   ```
   main() {
       int i = 3, pid;
       while(i > 0) {
           if ((pid = fork()) > 0) {
               printf("In parent %d.\n", i--);
           } else {
               printf("In child %d.\n", i);
               exit(0);
           }
       }
   }
   ```
   (2) (6%)
   ```
   #include <iostream>
   using std::cout;
   int sub (int &a, int &b) {
       a *= 3;
       cout << "a = " << a << ", b = " << b << "\n";
       return --a * b++;
   }
   int sum(int n) {
       if (n < 2) return 1;
       else return sum(n - 1) + sum(n - 2);
   }
   main() {
       int x = 4, y = 3;
       x = sub(y, y);
       cout << "x = " << x << ", y = " << y << "\n";
       x = sum(y);
       cout << "x = " << x << ", y = " << y << "\n";
   }
   ```

2. (15%) 請以 C 或 C++程式語言設計一個程式，能由鍵盤輸入三個數值，比較其大小後，依照數值大小，依序顯示出這三個數值。

3. (15%) 請以 C 或 C++程式語言設計一個程式，並利用兩個 FOR 或兩個 while 重複結構指令，讓使用者輸入一個數字 n 後(需介於 3~9 之間)，可印出下面圖案(下圖為 n=5)：

                    1
                   212
                  32123
                 4321234
                543212345

4. (20%) 請以 C 或 C++語言撰寫一個 strrev(char *)函數，確保能將參數字串內容反轉。
   例如：char string[20] = "book"; 執行 strrev(string)函數後會變成為"koob"。