1. (10 %) In FORTRAN programming it is possible to pass an array to a subroutine and declare that array with last index as 1 (or any number) in the subroutine, why?

2. (10 %) Graphic User Interface (GUI) has becoming the trend in developing application software. Please describe the advantages and disadvantages of the GUI?

3. (12 %) What is the output of the following C program and why ?

```
#include <stdio.h>
main() {
int i;
for (i=0; i < 3; i++) test();
}
test() {
static int i = 2;
printf("i=%d \n",i);
i++;
}
```

4. (12 %) What is a device driver in an operating system ? Give two methods that the operating system can recognize a service request from the I/O device.

5. (6 %) Please give three popular operating systems that can run on IBM PC and its compatibles.

6. (15 %) Explain the following abbreviations commonly used in operating system:
(a) FAT (b) DLL (c) MFLOPS (d) DMA (e) ISDN.

7. (15 %) Please explain and give an example of the following data structures and data types:

(a) data structures: list, array, tree.

(b) data types: enumeration and structure (e.g. enum and struct in C).

8. (20 %) Mr. Chen is amateur cyclist. He wishes to design a microprocessor-based device for real-time measuring the cycling distance and average speed.

(a) Please give your hardware design in block diagram. (Hints: mechanical or optical switch and timer/clock IC chip might be necessary)

(b) Explain your measurement algorithm in flowchart.