Name (Pinyin): _____   **姓名:** _____

S&T2024 Advanced C Programming Language Mock Test (Fourth Checkpoint)

Time allowed: 1 hour and 30 minutes

INSTRUCTIONS

1. This is a **CLOSED BOOK** examination.

2. This examination paper contains **5 questions** and 4 pages. Answer **all** questions.

3. The full score for each question is as follows:
   Question 1: 10   Question 2: 10   Question 3: 10
   Question 4: 20   Question 5: 50

4. Answers to the questions are to be written in a separate booklet.

5. Students are **NOT** allowed to bring any programmable calculator, machine translator, or dictionary with them. If you have any of these items, you are to surrender them before the test starts. **Violation of this regulation will be severely dealt with and may result in an expulsion from the bridging course**.

6. Students are also **NOT** allowed to bring any paper to the Examination Hall.

7. All the working steps must be shown.

8. This test paper will be collected at the end of the examination.
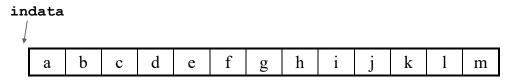
No.	Score 1 (Marker)	Score 2 (Checker)
1		
2		
3		
4		
5		

1.   Given the following declarations and initialization:

```
char unknown, this1= 'A', key='a';
```

What is the value of **unknown** after the following instruction is executed?

unknown = (this1 ^ key) ^ key;

(10 marks)

2.   A text file contains the following characters. Suppose the file pointer **indata** points at the beginning of the file when we run the program.

indata

a	b	c	d	e	f	g	h	i	j	k	l	m

What are the contents of **ch** after each **fread** instruction is executed in the following program segment ?

```
char ch;
  :
  :
fseek (indata, (long) 6, SEEK_CUR);
fread (&ch, sizeof (char), 1,indata);

fseek (indata, (long) -2, SEEK_CUR);
fread (&ch, sizeof (char), 1,indata);

fseek (indata, (long) -5, SEEK_END);
fread (&ch, sizeof (char), 1,indata);

fseek (indata, (long) 2, SEEK_CUR);
fread (&ch, sizeof (char), 1,indata);
```
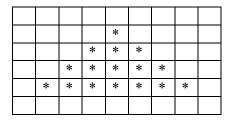
(10 marks)

3.   A random access file is opened daily for reading and writing, and the history of the transactions from the past days is required. Why the file open mode cannot be **w+b** ?

(10 marks)

4. Write a program that uses calloc to reserve memory to store the following table of characters and initialize them with the values specified.
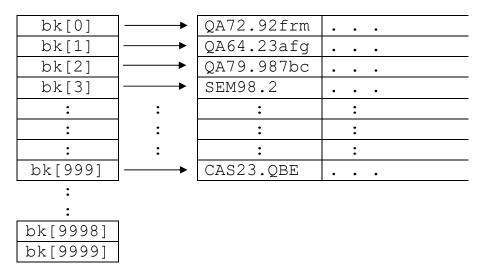
			*				
		*	*	*			
	*	*	*	*	*		
*	*	*	*	*	*	*	

(20 marks)

5. Bubble Sort in the worst case requires $\dfrac{n(n-1)}{2}$ data comparisons to sort an array of n data. To speed the sorting algorithm, a flag can be used to indicate if the data exchange has taken place during the iterative process. If no data exchange is needed for an iteration, the array is sorted so the algorithm can stop immediately. We call this enhanced algorithm as Flagged Bubble Sort. We are going to use the Flagged Bubble Sort to arrange an array of pointers to **book** structures in ascending order based on their call numbers.

    (i) Declare a struct named **book** to keep the book information, including the call number (up to 15 characters), author's name (up to 40 characters), ISBN number (up to 12 characters), quantity (integer) and price (real number).

    (ii) Given the following declaration for an array of pointers to struct,

```
struct book *bk[10000];
```

and the first 1000 pointers are initialized as follows:

bk[0] →	QA72.92frm	. . .
bk[1] →	QA64.23afg	. . .
bk[2] →	QA79.987bc	. . .
bk[3] →	SEM98.2	. . .
⋮ ⋮	⋮	⋮
⋮ ⋮	⋮	⋮
⋮ ⋮	⋮	⋮
bk[999] →	CAS23.QBE	. . .
⋮		
⋮		
bk[9998]		
bk[9999]		

Write the code fragment that uses the Flagged Bubble Sort to arrange the **bk** pointers in ascending order of call numbers. **The contents of book struct should not be rearranged**.

(50 Marks)

- End -