

Blank page for working

CSE1303 Part A – Data Structures and Algorithms

Question A1 (1 mark)

Given the following code:

```
typedef struct BookRec
{
    int quantity;
    char *title;
} Book;

Book Temp;
```

Which will correctly allocate 200 characters for the title, using `malloc()`?
(Circle the correct answer)

- (a) `Temp->title = (char*)malloc(200 * sizeof(char));`
- (b) `Temp.title = (char*)malloc(sizeof(char));`
- (c) `Temp->title = (char*)malloc(200 * sizeof char);`
- (d) `Temp.title = (char*)malloc(200 * sizeof(char));`

Question A2 (1 mark)

Consider the following code:

```
float a[4];

printf("%p %p %p %p", &a[0], &a[1], &a[2], &a[3]);
printf("%p", a+2);
```

Suppose after the first `printf()` the output is:

2008 200C 2010 2014

Then the output from the second `printf()` is:

- (a) 2018
- (b) 2004
- (c) 2010
- (d) 200C

Blank page for working

Question A3 (3 marks)

Assume a queue has been implemented using the following structure and the circular implementation given in lectures

```
#define MAXQUEUE 20

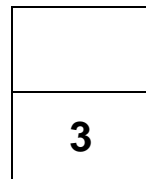
struct QueueRec
{
    int count;
    int front;
    int rear;
    float entry[MAXQUEUE];
};

typedef struct QueueRec Queue;
```

Write a C function:

```
void append(Queue* queuePtr, float item)
```

which adds an item to the queue.



Blank page for working

Question A4 (1 mark)

Given the following code

```
typedef struct StudentRec{
    long int ID;
    char name[5];
}Student;
Student *temp;

temp = (Student*)malloc(sizeof(Student));
strcpy(temp->name, "Anne");
temp->ID = 13052;
```

Draw a diagram to represent the structure in memory. Remember to label the variables, and include the values of the variables.

1

Blank page for working

Question A5 (1 + 1 = 2 marks)

Given the following code:

```
#define MAXLIST 4

typedef struct ElementRec
{
    float num;
    int next;
} Element;

typedef struct LinkListRec
{
    int start;
    Element entries[MAXLIST];
} LinkList;
```

Assume we have a variable: `LinkList list`

At some stage in the program the list looks like:

-4.5	1.5	-7.8	2.0
1	3	0	-1

`list.start` has the value **2**

- a) Using the following table show the contents of `list.entries` after deleting the value **1.5** from the list.
(Remember to move any of the existing items if a gap is created, to close the gap).

- b) What is the value of `list.start` after the deletion?

2

Blank page for working

Question A6 (1 + 1 = 2 marks)

For the following questions assume that a stack has been implemented using the array implementation given in the lectures.

a) Write a C declaration for a stack that can store items of type double

b) Write a C function print all the items in the stack from the top to the bottom, without changing the stack.:

2