

**UNIVERSITY OF PORTSMOUTH**

**FACULTY OF TECHNOLOGY**

**Department of Electronic and Computer Engineering**

**B142L – Introduction to Computing**

**U13746**

**Date: 22 May 2007**

**Time: 2 hours**

**INSTRUCTIONS**

Write your student ID number clearly on page 2.

Write your answers to all 10 questions within the spaces provided in this examination paper.

Handwritten notes are permitted with this examination.

**Calculators permitted are:**

Casio FX 85WA

Casio FX 83WA

Casio FX 85MS

**Examiner:**

Mr Chi Nguyen

Student ID Number

**QUESTION 1A.** Place an "X" in the box next to 5 terms that are basic data types in the C language. [5 marks]

<input type="checkbox"/>	imaginary	<input type="checkbox"/>	null
<input checked="" type="checkbox"/>	integer	<input type="checkbox"/>	array
<input checked="" type="checkbox"/>	character	<input type="checkbox"/>	complex
<input type="checkbox"/>	static	<input checked="" type="checkbox"/>	short
<input checked="" type="checkbox"/>	long	<input type="checkbox"/>	real
<input checked="" type="checkbox"/>	float	<input type="checkbox"/>	string

**QUESTION 1B.** Write a C program to calculate and display the average weight of mobile phones in the following list. Show or use in your program all of the terms you selected in Question 1A. [5 marks]

Nokia 2310	85 grams
Sony Ericsson K800i	115 grams
Motorola RAZR V3X	125 grams
BlackBerry 8800	134 grams

```
int main( void )
{
    int nokia = 85; /* integer data type */
    int sony = 115;
    short motorola = 125;
    long blackberry = 134;
    float average = ( nokia + sony + motorola + blackberry ) / 4.0;

    /* array of character data type */
    char message[] = "The average weight is: ";

    printf( "%s%.1f", message, average );
}
```

Consider the following source code to answer Question 2. Line numbers have been provided at the start of each line for reference. Indicate specific line numbers in your answers when necessary.

```
01: int main( void )
02: {
03:     int dvdAvailable = 250;
04:     int dvdPurchase = 0;
05:     int dvdPrice = 10; /* in pence */
06:
07:     printf( "How many DVD copies would you like to purchase? " );
08:     scanf( "%d", &dvdPurchase );
09: }
```

**QUESTION 2A.** Modify the source code to display a message when the input purchase quantity is higher than the number of DVD copies available. [4 marks]

Add after line 8:

```
if ( dvdPurchase > dvdAvailable )
    printf( "There are not enough DVD copies available" );
```

**QUESTION 2B.** Modify the source code to display the total purchase price in British pounds when DVD copies are sold. [6 marks]

Add after line 8:

```
if ( dvdPurchase > dvdAvailable )
    printf( "There are not enough DVD copies available" );
else
{
    float totalPrice = ( dvdPurchase * dvdPrice ) / 100.0;
    printf( "The total purchase price is %.2f pounds", totalPrice );
}
```

Consider the following source code to answer Question 3. Line numbers have been provided at the start of each line for reference. Indicate specific line numbers in your answers when necessary.

```
01: int main( void )
02: {
03:     char secret[] = "portsmouth";
04:     char password[ 24 ] = { '\0' };
05:     int status = 0;
06:
07:     printf( "Please type password: " );
08:     scanf( "%s", password );
09: }
```

**QUESTION 3A.** Modify the source code to assign the status variable a value of 1 when the password matches the secret word. [4 marks]

Add before line 1:

```
#include <string.h>
```

Add after line 8:

```
if ( strcmp( password, secret ) == 0 )
    status = 1;
```

**QUESTION 3B.** Modify the source code and use a for loop to allow the user at most 3 attempts at typing the correct password. [6 marks]

Add before line 1:

```
#include <string.h>
```

Add after line 6:

```
int counter;
for ( counter = 0; ( counter < 3 ) && ( status != 1 ); counter++ )
{
```

Add after line 8:

```
if ( strcmp( password, secret ) == 0 )
    status = 1;
}
```

Consider the following source code to answer Question 4. Line numbers have been provided at the start of each line for reference. Indicate specific line numbers in your answers when necessary.

```
01: int main( void )
02: {
03:     int maxTemperature = 150;
04:     int inputTemperature = 0;
05:
06:     printf( "Please enter temperature now: " );
07:     scanf( "%d", &inputTemperature );
08: }
```

**QUESTION 4A.** Modify the source code and use a while loop to ask for an input temperature until the input value is greater than the maximum temperature. [5 marks]

Add before line 6:

```
while ( inputTemperature <= maxTemperature )
{
```

Add after line 7:

```
}
```

**QUESTION 4B.** Modify the source code for Question 4A to ask for an input temperature until the input value is greater than the maximum temperature or lower than the minimum temperature of -10. [5 marks]

Add before line 6:

```
int minTemperature = -10;
while ( ( inputTemperature <= maxTemperature ) &&
        ( inputTemperature >= minTemperature ) )
{
```

Add after line 7:

```
}
```

**QUESTION 5A.** Place an "X" in the box next to 5 terms that are most directly related to the use of arrays in a C program. [5 marks]

X	element		absolute
	boundary	X	length
	list		main
X	type		limit
	first	X	index
	double	X	name

**QUESTION 5B.** Write a C program to collect 100 input numbers and store them in an array of integers. Show or use in your program all of the terms you selected in Question 5A. [5 marks]

```
int main( void )
{
    /* array name is inputValues */
    /* array size is 100 */
    /* array type is integer */
    int inputValues[ 100 ] = { 0 };

    int counter;

    for ( counter = 0; counter < 100; counter++ )
    {
        printf( "Please enter a number: " );

        /* counter is the index to the active array element */
        scanf( "%d", &inputValues[ counter ] );
    }
}
```

Consider the following source code to answer Question 6. Line numbers have been provided at the start of each line for reference. Indicate specific line numbers in your answers when necessary.

```
01: int main( void )
02: {
03:     int numbers[] = { 3, 6, 7, 14, 15, 30, 31, 62, 63, 126 };
04:     int counter;
05: }
```

**QUESTION 6A.** Modify the source code to display all odd values in the numbers array. [5 marks]

Add after line 4:

```
for ( counter = 0; counter < 10; counter++ )
{
    if ( ( numbers[ counter ] % 2 ) != 0 )
        printf( "%d\n", numbers[ counter ] );
}
```

**QUESTION 6B.** Modify the source code so that all even values in the numbers array are replaced by the current value plus 10. [5 marks]

Add after line 4:

```
for ( counter = 0; counter < 10; counter++ )
{
    if ( ( numbers[ counter ] % 2 ) == 0 )
        numbers[ counter ] = numbers[ counter ] + 10;
}
```

**QUESTION 7A.** Place an “X” in the box next to 5 terms that are most directly related to the use of functions in a C program. [5 marks]

<input type="checkbox"/>	virtual	<input type="checkbox"/>	declaration
<input type="checkbox"/>	global variable	<input checked="" type="checkbox"/>	return value
<input checked="" type="checkbox"/>	definition	<input checked="" type="checkbox"/>	prototype
<input type="checkbox"/>	address	<input type="checkbox"/>	extern
<input checked="" type="checkbox"/>	parameter	<input checked="" type="checkbox"/>	local variable
<input type="checkbox"/>	template	<input type="checkbox"/>	assignment

**QUESTION 7B.** Write a C function that accepts an integer input as the width of a rectangle and returns an integer output which is the area of the rectangle. The height of the rectangle is defined inside the function. Show or use in your function all of the terms you selected in Question 7A. [5 marks]

```
/* function prototype */
int area( int );

/* function definition */
int area( int width ) /* width is a function parameter */
{
    int height = 10; /* height is a local variable */

    return width * height; /* the return value */
}
```

**QUESTION 8A.** Write a function that **calculates and returns the total sales** for a given number of months. The **first input value is the number of months** and the **second input value is a pointer to an array of sales values per month**. The prototype is provided below. [6 marks]

```
float totalSales( int, float* );
```

```
float totalSales( int months, float* sales )
{
    float total = 0.0;
    int counter;

    for ( counter = 0; counter < months; counter++ )
        total += sales[ counter ];

    return total;
}
```

**QUESTION 8B.** Write a C program that **calls the function you wrote in Question 8A and displays the total sales value for the following months**. [4 marks]

January	£120.50	February	£90.12
March	£140.10	April	£190.30
May	£112.09	June	£160.55

```
int main( void )
{
    float monthlySales[] = { 120.50, 90.12, 140.10, 190.30, 112.09,
160.55 };

    printf( "Total sales is %.2f", totalSales( 6, monthlySales ) );
}
```

Consider the following data file to answer Question 9. The data file is located at "C:/websites.txt"

```
uk.ask.com
uk.msn.com
uk.yahoo.com
www.google.co.uk
www.technorati.com
```

**QUESTION 9.** Write a C program to read and display the contents of the data file above. [10 marks]

```
#include <stdio.h>

int main( void )
{
    char websites[ 5 ][ 64 ] = { '\0' };
    FILE* websiteFile = fopen( "C:/websites.txt", "r" );
    int counter = 0;

    if ( websiteFile != NULL )
    {
        while ( ( fscanf( websiteFile, "%s", websites[ counter ] ) != EOF )
                && ( counter < 5 ) )
        {
            printf( "%s\n", websites[ counter ] );
            counter++;
        }
        fclose( websiteFile );
    }
}
```

**QUESTION 10.** Write a C program that asks a student to enter marks for 6 units and save all the marks to a data file at location "C:/marks.txt" [10 marks]

```
#include <stdio.h>

int main( void )
{
    FILE* marksFile = fopen( "C:/marks.txt", "w" );
    int mark, counter;

    if ( marksFile != NULL )
    {
        for ( counter = 0; counter < 6; counter++ )
        {
            printf( "Please enter mark %d: ", counter + 1 );
            scanf( "%d", &mark );
            fprintf( marksFile, "%d\n", mark );
        }
        fclose( marksFile );
    }
}
```