

**Department of Computing  
End of Semester 2 Central Examinations - November 2010**

**Attendance Mode:** Internal  
**Centre(s):** Bentley Campus  
**Unit(s):** 308875 - Programming 215  
**Duration:** 2 Hours *Prior to commencement of the examination there will be a 10-minute reading period. During this period notes may be written in margins or reverse of the examination paper. Commencement of the examination will be indicated by the supervisor.*  
**Total Marks:** 100  
**Calculator:** No, not allowed  
**Supplied by the University:**  
1 x 16 page answer book  
**Supplied by the Student:**  
None

**THIS IS A CLOSED BOOK EXAMINATION**

**IMPORTANT INFORMATION**

- The possession or use of:

**Mobile phones** or any other device capable of communicating information, are prohibited during examinations.

**Electronic Organisers/PDAs** (with the exception of calculators) or other similar devices capable of storing text or restricted information are prohibited during examinations.

**Any breach of examination regulations will be considered cheating and appropriate action will be taken in accordance with University policy.**

**Other Information:**

This paper contains Four (4) questions and each question is worth 25 marks. Attempt all questions.

**QUESTION ONE** Concerns Unit Learning Outcome One and is worth 25 Marks.

(a) List four (4) things placed in a C header file. Explain two (2) of these four things.

[ 6 marks ]

- (b) Given that the header file for a C program is called "Question1.h", write a C function which:
- Is called `lessThanImport`.
  - Has an array of `int` called `theArray` as a parameter.
  - Has an `int` called `compareValue` as a parameter. This parameter is set to the number each element in `theArray` will be compared to.
  - Has an `int` called `arrayLength` as a parameter which is the number of elements in `theArray`.
  - Returns the total number of elements in `theArray` that are less than the `compareValue` parameter.

[ 11 marks ]

- (c) Given the parameters to the function in part (b), define a suitable `typedef` so that the array, its size and the number that each element of the array will be compared are encapsulated in one variable.

[ 8 marks ]

**QUESTION TWO** Concerns Unit Learning Outcome Two and is worth 25 Marks.

- (a) List two advantages of using the debugger to diagnose errors in your C code, as opposed to writing output to a text file.

[ 6 marks ]

- (b) The company you are working for has recently produced software with lots of defects within them. Your boss is very concerned and has asked you to write up a debugging strategy to implement. Assuming that you will use `gdb` or `ddd`. write the debugging strategy plan with a small explanation of what each step may achieve (Note: if you cannot recall an exact name of a `gdb` or `ddd` command, a generic name that adequately describes it will suffice).

[ 12 marks ]

- (c) State whether or not you agree or disagree with the statement below. You must provide a valid justification for your answer.

*"Using the debugger prevents developers from making errors in their C programs."*

[ 7 marks ]

**QUESTION THREE AND FOUR ARE ON THE NEXT PAGE**

**QUESTION THREE Concerns Unit Learning Outcome Three and is worth 25 Marks.**

The header file for a C program is called "Question3.h" and the *typedef* statements below are included in the header file. The *int* constant `CURRENT_YEAR` is defined in the header file. Write a C function which:

- Is called `createMovieList`
- Does the dynamic memory allocation and initialisation for a variable, which is a pointer to `MOVIELIST`.
- Has a parameter called `howManyMovies` that specifies how long the array of `MOVIE` should be which will also then be stored in `numberOfMovies`.
- Returns the pointer to the calling function.
- Assumes that each movie in the list has its `imdb` set to 0, `year` set to `CURRENT_YEAR` and `numberPrinted` set to 500.

```
typedef struct
{
    int imdb;
    int year;
    int numberPrinted;
} MOVIE;
typedef struct
{
    int numberOfMovies;
    MOVIE *movies;
} MOVIELIST;
```

[ 25 marks ]

**QUESTION FOUR Concerns Unit Learning Outcome Four and is worth 25 Marks.**

(a) Given that the following variables are declared and initialised as below:

```
int nimrod = -174, petra = 865;
double lazarus = 7.013587690872, negev = 0.098327, giza = 9.025;
```

Show the output given by the following `fprintf` statements (Please use an underscore, i.e. `_`, to represent blank spaces in the output).

- (i) `fprintf( stdout, "%4d", nimrod );`
- (ii) `fprintf( stdout, "%5d", petra );`
- (iii) `fprintf( stdout, "%16.4lf", lazarus );`
- (iv) `fprintf( stdout, "%7.0lf", negev );`
- (v) `fprintf( stdout, "%6.4lf", giza );`

[ 5 marks ]

(b) The header file for a C program is called "Question4.h". Write a C function which:

- Is called `copyData`
- Has the following parameters:
  - A `char` pointer called `originalFileName`
  - A `char` pointer called `copyFileName`
  - An `int` called `totalNums`
- Opens the file for reading whose name is contained in the `originalFileName` parameter.
- If the file cannot be opened successfully then the function should just output an error message to the user.
- Opens a file for writing whose name is contained in the `copyFileName` parameter.
- If the file cannot be opened successfully then the function should just output an error message to the user.
- The function should read the numbers listed in the file `originalFileName` and write the numbers into `copyFileName` with a field width of 8 and 3 decimal places.
- The file `originalFileName` contains integers stored on one line separated by spaces.

[ 20 marks ]

**END OF EXAMINATION PAPER**