BINGHAM UNIVERSITY
FACULTY OF SCIENCE AND TECHNOLOGY
COMPUTER SCIENCE DEPARTMENT
SECOND SEMESTER EXAMINATIONS, AUGUST, 2018
200 LEVEL
CMP212 FUNDAMENTALS OF DATA STRUCTURES
TIME ALLOWED: 2HRS
ANSWER ANY 3 QUESTIONS

1. (a) What are the main differences between the **int** data type (integer) and the **float** data type?

(b) How can you represent the following numbers in scientific notation? (C++) (i) 3500 (ii) 0.00835

(iii) -0.000077 (iv)100000000

(c) Write the following numbers in the normal decimal notation (i) 705E-4 (ii) 9.2345E+5 (iii) -3E2

2. What would be the best variable type for:

(a) the mass of an atom in milligrams?

(b) the number of cars at the car park?

(c) the name of a country's capital city?

(d) the first letter of the name of a university?

(e) in a single line of code briefly illustrate **each** of the above declarations in any programming language.

3. (a) Classify the following numbers as VALID or INVALID REAL numbers giving your reasons (C++).

(i) 49.6E5 (ii) 7.567E6 (iii) -8.146 (iv) 47.0E-04 (v) -45E+0.4 (vi) 0.004478 (vii) 3.698E.3

(viii) 5.1773E-4 (ix) -72E+2 (x) e+7

(b) Write the above numbers in the normal decimal notation (where applicable).

4. (a) (i) Give and initialize a **one**-dimensional array named **Y** with 25 hypothetical elements of your choice where each element is not more than 20 in value.

(ii) What is the sum of the first and last elements in your array?

(iii) What is the value of **Y** (19)?

(iv) What is the value of **Y** (8) - **Y** (10)?

(b) Give and initialize a **two**-dimensional array named **X**.

Fill a table of this array with numbers of your choice.

(i) What is the sum of the first and last elements in your array?

(ii) Given I=3 and J=4 what is the value of the **X** $(J,I)^{th}$ element in your array? [BASIC format]

(iii) Given L=2 and M=5 what is the value of **X** (L,M)?

(iv) From your table, what is the value of **X** (3,3) - **X** (4,4)?

5. "A Linked list is a very powerful, and very versatile, data structure, No matter what programming project you eventually undertake, it's very likely that you'll want to use a linked list at a point." Why are linked lists so popular and important?

(I) Illustrate with a fully labelled diagram a singly linked list with 5 nodes.

(II) Illustrate how you will implement an **insertion** of a new node between the first and second nodes.

(III) Illustrate how you will delete the third node from the list.

Fully explain your answer in each case.

(b) Given the following numbers

(i) 75e-3 (ii) -53e8 (iii) 3.414e+9

write them out as normal decimal numbers

(c) Given the following numbers show how they will be represented in the memory of a 32-bit machine:

(i) -378.53 (ii) 2100000 (iii) 0.0000009

Show all working

4. (a) What is an array?

(b) Explain with examples the importance of arrays in computer programming

(c) Write briefly, with two appropriate examples each, your understanding of the following array types:

(i) One dimensional (ii) Multidimensional (iii) three dimensional

(iv) two dimensional

(d) (i) Give and initialize a **one**-dimensional array named **MARKS** with 32 hypothetical elements (between 1 and 100) of your choice.

Using the **C++** format:

(ii) List **MARKS**(17), **MARKS**(22), **MARKS**(7), **MARKS**(32) in that order.

(iii) What is the value of **MARKS**(8) + **MARKS**(28)?

5. (a) Give and initialize a **two**-dimensional array named **CMP** with 8 columns and 10 rows.

Fill a table of this array with numbers of your choice.

(i) What is the product of the first and last elements of your array?

Using the **BASIC** format:

(ii) Given I=5 and J=8 what is the value of **CMP** (J,I)?

(iii) Given L=6 and M=7 what is the value of **CMP**(L,M)?

(iv) From your table, what is the value of **CMP** (5,7)/**CMP**(6,3)?

(v) Give a short **general** program segment to implement the sum of all the numbers of the 4^{th} row.

(vi) Give a short **general** program segment to implement the **average** of all the numbers of the array **CMP**.

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SECOND SEMESTER EXAMINATION, 2018/2019 SESSION

COURSE TITLE: FUNDAMENTALS OF DATA STRUCTURES
COURSE CODE: CMP 212 **COURSE CREDIT UNITS:** 2
TIME ALLOWED: 2 HRS
INSTRUCTION: ANSWER ANY THREE QUESTIONS

1. (a) Give your understanding of each of the following:

(i) Data types in general (ii) Primitive data type

(b) Why is it necessary to declare variables before using them in your program?

(c) Explain with appropriate examples the following data types and the role they play in computer programming: **int, float, bool,** and **char**

(d) Give the decimal equivalents of

(i) (88050e-4) * (15.5e+3) (ii) -333e-8/(5e+5)

2. (a) Distinguish among **file, record** and **field** using relevant examples to explain your answer.

(b). Given the following table of SALES (in NAIRA) identify and list

DEPARTMENTS

Store	1	2	3	4	5
1	28720	80500	32110	15600	87500
2	21960	12230	25250	17450	95250
3	32570	10170	36860	19510	12700
4	36853	97352	67380	13750	92500
5	69420	97420	90520	21650	25100
6	78650	43250	87400	33600	74500

(i) any three **fields** (ii) any three **records** (iii) the file

(c) If the 32-bit machine representation of a number in memory is

0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 1 1 1 1 1 1 1 1

What is the number? (show all working for full marks).

(d) Write the following in C++ scientific notation

(i) 0.00000293 (ii) 55/8888

3. (a) Give the scientific notation of the following numbers:

(i) 0.00026 (ii) -0.0000000314 (iii) 290000000000