UNIVERSITY OF GHANA

BSC. INFORMATINO TECHNOLOGY, FIRST SEMESTER EXAMINATIONS: 2015/

2016

CSIT105 – PROGRAMMING FUNDAMENTALS (3 CREDITS)

INSTRUCTION:

The question paper consists of Two sections, Section A and Section B.

In Section A, attempt <u>All</u> questions.

In Section B, answer question B1 (compulsory) and <u>any other</u> question.

Answer Booklets will be provided.

NO CALCULATORS ALLOWED.

TIME ALLOWED:

TWO AND HALF (2 ½) HOURS

<u>SECTION A</u> (60 Marks)

Answer **all** questions in this section.

A1.   In three short sentences describe the major aims of the Information Technology course

Programming Fundamentals.   **[3 marks]**

A2.   List the steps involved in Program Development.   **[2 marks]**

A3.   List six aims of Program Design.   **[3 marks]**

A4.   Name two ways to test the correctness of computer programs.   **[2 marks]**

A5. Draw and label the Multi-layered Computer machine. **[3 marks]**

A6. State the role of the Instruction Pointer in the execution of instructions by the computer.

[2 marks]

A7. Define the term flow control. **[2 marks]**

A8. Give the major characteristics of a John von Neumann Machine. **[3 marks]**

A9. Define the term Computer Program. **[2 marks]**

A10. List two advantages of Notational Languages. **[2 marks]**

A11. List two ways in which Procedural languages achieved program portability. **[2 marks]**

A12. List two ways used by Procedural languages to exploit parallel and distributed computer hardware. **[2 marks]**

A13. List four features of 4th Generation languages. **[2 marks]**

A14. Name any two Artificial Intelligence languages. **[1 mark]**

A15. How do Very High Level Languages handle computer memory? **[1 mark]**

A16. Define the term Instruction Set of a programming language. **[2 marks]**

A17. List six types of Instruction set. **[3 marks]**

A18. Name any two international organizations that are involved in the standardization of High Level Languages. **[2 marks]**

A19. Name the three principles of imperative programming. **[3 marks]**

A20. What will be the output of the following program? **[2 marks]**

int main()

{

int k, num = 20 ;

k = (num > 5 **?** (num <= 10 **?** 100 **:** 200) **:** 500) ;

cout << endl <<, num;

}

A21.   What do Declarative languages allow the programmer to do?   **[2 marks]**

A22. What is lexical level analysis? **[1 mark]**

A23. Convert the following binary numbers into decimal :- **[2 marks]**

I. 1 0 0 1   ii. 1 0 1 0   iii. 1 1 0 0   iv. 1 0 1 1 0 1 1 1

A24. Convert the following decimal numbers into binary **[2 marks]**

I. 4519   ii. 168   iii. 519   iv. 2048

A25. Rewrite the following C++-lang arithmetic statements in their short form for faster processing:-

I. **moon = water + moon ; ii.   ash = ash - 1 ; iii.   byte1 = (small – 12) * byte1;**

[3 marks]

A26. Determine   a. **the hierarchy** of operations and   b. **evaluate** the expression below

int k = 3 / 2 * 4 + 3 / 8 – 1 **[2 marks]**

A27. What will be the output of the following program? **[2 marks]**

```
int main()
{
int i=4, j = -1, k =0,w, x, y, z ;
w = i || j  || k ;
x  = i && j && k;
y  = i || j && k ;
z  = i && j || k ;
cout << w << x  << y  << z;
}
```

A28. Figure 1 below is a control structure. Identify the type of control structure represented and give a C++ control statement that implements it.   **[2 marks]**

Figure 1.

VALUE 1   VALUE 2 VALUE N   SOME OTHER VALUE

SECTION B (40 Marks)

In this section you are to answer question **B1**. and any other question.

B1. (compulsory)   (20 Marks)

The C++ main function below is to accept any five integer scores from the user, then uses an

algorithm to pick one score out of the given five. After picking the wanted score the program

finds the difference of each score from the wanted score that was picked and displays all results.

There are a number of C++ syntax errors in the program. The only logical error has to do with <u>th</u>

<u>e display</u> of the differences calculated, otherwise the logic is correct.

```
#include <iostream>
```

1. using namespace stdio
2. main()
3. {
4. /My prog declarations;
6. int i, score[5], 7want ;
7. /My prog accepts five integer scores from the user into the data array score[];
8. cout<< "Enter five integer scores :\n";
9. for(i=0; i< 5; i++)
10. {
11. cin>> score[i];
12. }
13. /Myprog uses a short sorting algorithm to pick the score 7want;
14. / that I want out of the five input integer scores;
15. 7want = score[0];
16. for (i=0; i<5; i++)
17. {
18. if (score[i] > 7want)
19. 7want = score[i];
20. /Myprog displays the result as follows;
21. cout<< "The score I want is" << 7want <<endl
22. /after picking the score I wanted , the prog determines the difference of each;
23. /input score from the score I picked and displays them as follows;
24. cout<< "The scores and their "

25.   << "difference from the score I want are :\n";

26.   for (i<0; i < 5; i++)

27.   {

28.   cout<< score[i] << " off by " << (7want - score[i]) <<endl;

29.   }

30.   system("pause");

31.   return 0;   }

Required:

Study the program carefully and do the following:

Correct all the C++ syntax errors in the program. Write the correct syntax-error-free version in your answer booklet.

B2.   (20 marks)

University of Ghana Academic Section needs **Exam Booklet label** to identify answer booklets used by candidates during an End of Semester Examination.. An Exam booklet

label shows the **Course Code** followed by the **Booklet number** and the **Total Number of Cand idates** expected to write the examination.

The inputs to the program are a course code for a particular exam and the number of candidates to take that exam.

    a. Design an algorithm to solve the problem stated.   [10 marks]

    b. Write a C++ program to print Ex**am Booklet label** for each booklet to used in the a given exam.   [10 marks]

Example of specification

Input:

Enter the Course Code :   **CSIT105**

Enter the No of Exam Candidates: **100**

Output:

    University of Ghana End of Semester Exams

    Course Code : **CSIT105**   Booklet Number 1 of **100**

University of Ghana End of Semester Exams

    Course Code : **CSIT105**   Booklet Number 2 of **100**

University of Ghana End of Semester Exams

    Course Code : **CSIT105**   Booklet Number 3 of **100**

      ....

University of Ghana End of Semester Exams

    Course Code : **CSIT105**   Booklet Number 100 of **100**

B3.   **(20 marks)**

The Ghana Susu Bank suspects that some of its customer account details have been compromised by hackers. The bank has 1000 customers and the account number of its customers starts from 1 and ends at 1000. Customers with account numbers 201 through to 500 are those compromised.

There are two transaction types that a customer of the bank can do; **Enquiries Transaction** and **A ccounts Transaction**. To do a transaction, the customer will first provide his/her account number and next provide the transaction type. If the transaction type is **Enquiries**

the message **" Enquiry in Progress …. Please wait "** is displayed on the screen. If the transaction type is **Accounts** then the message **"Accounts processing in Progress "** is displayed on the screen **for a non-compromised customer account number** or **"Dear valued Customer, contact the Customer Service Desk "** is displayed on the screen for a **compromised customer account number**.

    a. A customer of the bank inputs his/her account number followed by the transaction type. The system responds with the appropriate message on the screen.   Draw a flowchart of the logic.   [10 marks]

    b. Write a C++ program that implements the flowchart in (a.).   [10 marks]

B4.   (20 Marks)

Give the meaning and **state the importance** or relevance of **any ten** of the following computer programming terms. **Give examples** where applicable.

    I. Programming language   ii.   BNF   iii.   Machine language

iv.   Formal language   v.   Pseudocode vi.   Translator

vii.   Identifiers   viii.   Algorithm ix.   Semantic errors

  x.   Variables   xi.   Camel casing xii.   Reserved/key words

  xiii.   Procedural programming   xiv.   "Top down" design xv. Program Parsing

  xvi.   Event-driven programming   xvii.   Function xviii.   Recursive function

  xix.   Declaration   xx.   Mixed-mode expression