UNIVERSITY OF GHANA

BA/BSC COMPUTER SCIENCE/INFORMATION TECHNOLOGY

SECOND SEMESTER EXAMINATIONS: 2016

CSIT 102: INTRODUCTION TO IT PROBLEM SOLVING (3 CREDITS)

INSTRUCTIONS:

ANSWER ALL QUESTION IN SECTION A.

ANSWER QUESTION 1 AND ANY OTHER ONE QUESTION IN SECTION B.

ALL QUESTIONS MUST BE ANSWERED IN THE ANSWER BOOKLET

TIME ALLOWED:

TWO AND HALF HOURS

SECTION A

Answer all questions in this section. (40 marks)

1. There are two types of solutions to a problem. _____ and _____ solutions.
2. _____is a set of instructions for solution using a computer language.
3. _____ is an outcome or computer assisted answer.
4. _____ is a set of instructions followed to produce best result.
5. _____ kind of problems are difficult for the computer to solve.
6. _____ is a value that never changes during processing.
7. Spaces are allowed in a variable name. True / False?
8. A _____ is a very large, integrated collection of data.
9. Sum * firstNumber; is an example of _____.
10. FinalSum = Sum * firstNumber; is an example of _____.

11. _____ is an old system that is no longer in use (probably due to poor maintenance) and has been replaced by a new and more efficient system.

12. IPO stands for ____.
13. An error is also known as _____.
14. The rules which govern the way a language is used or applied is known as __.
15. In a double linked list, the head's previous and the trailer's next always points to ____.
16. To analyze a problem using PAC, one must know ___, ____, ___ and ___.
17. A module is also known as _____.
18. The three logic structures are ____, ____ and _____.
19. Modules, there is always one ___ and one ____.
20. _____ is the ability for a module to work independently from all other modules.
21. Coupling can be done through the use of ____, _____ and ____.
22. _____ may be defined within a module and may be used only by the module itself.
23. The _____ of a variable designates where the value of the variable can be used.

Use this simple funtion to answer question 26 and 27

```
Void sum(int n, int m, int p){int total = n + m + p;}
Sum(5,4,9);
```

1. The letters n, m and p are called _____
2. The values 5, 4 and 9 are called _____.
3. Call-by-value _____ while call-by-reference _____.
4. A function that calls itself is called _____.
5. In a binary tree, each node may have a maximum of ____ children.
6. _____ is a visual illustration of an algorithm.
7. _____ is a generic language representation of an algorithm.

SECTION B

Answer question 1 and any other one question.

Question 1 (35 marks):

a. Use IPO chart, Algorithm and Flowchart to analyze and solve the problem below:
One of the jobs that Joe Roberts has been given at work is to order special paper for a report for a board meeting. The paper comes in reams of 500 sheets. He always makes five more copies than the number of people that will be there. Joe wants to know how many reams of paper he needs for a meeting. He can order only whole, not partial, reams. Assume the required number of pages will not equal an exact number of reams. Test your solution with the following data:
The report is 140 pages long.
There will be 25 people at the meeting. **(20 marks)**

a. State four UML diagrams **(2 marks)**

b. Differentiate between coupling and cohesion with a technical example. **(2 marks)**

c. Write down the logical expression for this condition: A large store has its own charge card. The policy for a customer to charge an item is that the customer must have a valid charge card and either a balance of less than $750 or a charge of less than $50. **(3 marks)**

d. Write short notes on the different stages in the Software Development Cycle **(5 marks)**

e. Briefly explain the different types of documentation. **(3 marks)**

QUESTION 2 (25 marks)

a. Construct a Binary Search Tree from the numbers below.
91,87,95,29,89,94,14,32,88,90,100,130,7,30,20,41,97,143,124,121. **(5marks)**

a. Perform a Pre order traversal on the tree from (a). **(4 marks)**

b. Perform a post order traversal on the tree from (a). **(4 marks)**

c. Delete the node 100 and reconstruct the BST showing its successor. **(3 marks)**

d. Write a function to implement bubble sort algorithm in C++. **(6marks)**

e. Describe how the minimum and maximum values are found on a BST? **(3 marks)**

Question 3 (25 marks)

a. Assume six nodes with key values F, D, C, B, E and A are stored at memory locations 3,5,2,7,8 and 9 respectively. The nodes are to be linked to form a doubly-linked list. Draw the list showing the Left and Right links of each node and values for the Header and Trailer nodes. **(5 marks)**

b. Delete the node with key value C and Show the resulting linked list **(2 marks)**

c. Insert a node with key value Z and memory location 4 at the tail of list and show the resulting list. **(2 marks)**

d. Write a function to implement selection sort algorithm in C++ **(6 marks)**

e. The University of Ghana, Legon needs a database to store records. The school has students who attend classes taught by lecturers. Administrators manage both lecturers and non-teaching staff. A student can take up to six courses. A lecturer can teach up to three courses. A course can generate up to three classes. A staff may marry a staff of opposite sex.

I. State the entities to be included in the database.

II. Include at least 4 attributes for each entity stated above.

III. State the relationship that each entity has with itself and or other entities.

(7 marks)

a. Write six complex mathematics formulae and convert them into machine readable form. **(3 marks)**