UNIVERSITY OF GHANA

BSc. INFORMATION TECHNOLOGY, SECOND SEMESTER EXAMINATIONS

2016/2017

CSIT 102: INTRODUCTION TO I.T PROBLEM SOLVING (3 CREDIT)

TIME ALLOWED:

TWO AND HALF (2½) HOURS

INSTRUCTIONS:

Section A: *Answer ALL Questions on the Question Paper and Attach to your Answer Booklet.*

Section B: *Answer ALL Questions in the Answer Booklet.*

Section C: *Answer* ***ONE (1) Question Only*** *in Your Answer Booklets.*

SECTION A (40 Marks)

Answer all questions on the Question Paper and Attach to your Answer Booklet.

A1. A sequential search

a. Starts with the first element of an array and searches each element until the correct one is found.

b. Starts with the last element of an array and searches upward until the correct one is found.

c. Starts with the middle element of an array and searches each direction until the correct one is found.

d. Does not have to have the array in order.

A2. Use the selection exchange method to show the first pass of the following array:

Element	Values
1	15
2	23
3	17
4	12
5	65

a. 12, 17, 23, 15, 65

b. 12, 23, 17, 15, 65

c. 15, 17, 12, 23, 65

d. 17, 15, 12, 23, 65

A2. The binary search

a. Starts with the first element of an array and searches each element until the correct one is found.

b. Starts with the middle element and tests to see if the number is larger or smaller than that element and continues in the same manner until the element is found.

c. Does not have to have the array in order.

d. Is another name for a sequential search.

A3. The pointer technique:

a. Points to the correct value in an array by supplying the element number.

b. Uses the value of an element in one array as the element number in another array.

c. Finds the last element in an array with a value other than zero.

d. Allows the developer to point to any element in any array given the element number.

A4. Numerical data includes all integer numbers and all real numbers.

a. True

b. False

A5. A final step in problem solving is to evaluate the solution. This means:

a. To check if the knowledge base for errors.

b. To check if the set of step by step instructions developed in step 5, list instructions that enable you to solve the problem, solve the problem identified in step 1.

c. To check is the solution solves a problem.

d. To test for understanding of the identified problem.

A6. Character data includes all numerical data.

a. True

b. False

A7. Use the bubble sort method to show the first pass of the following array:

Element	Values
1	15
2	23
3	17
4	12
5	65

a. 12, 17, 23, 15, 65

b. 12, 23, 17, 15, 65

c. 15, 17, 12, 23, 65

d. 17, 15, 12, 23, 65

A2. True (T, y, or yes) and False (F, n, or no) are the only values in the logical data set.

a. True

b. False

A3. An equation and an expression are the same thing.

a. True
b. False

A4. A function is a set of instructions to input data into the computer.
a. True
b. False

A5. A parallelogram in a flowchart represents:
a. The start or end of the solution.
b. A process.
c. Input or Output.
d. A decision.

A6. Which of the following is correct? When a module is processed:
a. The computer jumps to the module, executes the instructions in the module, and then quits.
b. The computer jumps to the module, executes the instructions in the module, and then returns to the next executable instruction.
c. The computer jumps to the module, executes the instructions in the module, and then jumps to another module according to the structure chart.
d. The computer ignores the module and returns later to execute the instructions.

A7. Cohesion is the ability of a module to be independent from other modules.
a. True
b. False

A8. Modules are not necessary to use when programming.
a. True
b. False

A9. Modules should have a designated function.
a. True
b. False

A10. A heuristic and an algorithmic solution require the same type of problem solving approach to develop a step by step solution to a problem.
a. True
b. False

A11. Identifying the problem is the first step in problem solving.
a. True
b. False

A12. Defining the knowledge base is part of understanding the problem.
a. True
b. False

A13. To identify alternative ways to solve a problem means:
a. To define the knowledge base of all participants.
b. To write a list of pros and cons for each solution.
c. To identify as many solutions as possible to the problem.
d. To identify a few solutions to the problem.

A14. Coupling allows:
a. Data to be passed from one module to all other modules.
b. Data to be passes from one module to another module.
c. Data to be unavailable to other modules.
d. Instructions to be available to other modules.

A15. The algorithm of a module always starts with:

a. A flattened ellipse.
b. The module name and number.
c. The name of the program.
d. The name of the developer.

A16. Data can be made available to other modules through the use of:
a. Parameters.
b. Global variables.
c. Return values.
d. All of the above.

A17. The problem analysis chart, the IPO chart, the structure chart, the algorithms, and the flowchart are all tools to be used in the development of a solution to a problem.
a. True
b. False

A18. The flattened ellipse in a flowchart indicates:
a. A process.
b. An input or output instruction.
c. A decision.
d. The start or stop of the module.

A19. The rectangle in a flowchart indicates:
a. A process.
b. An input or output instruction.
c. A decision.
d. A module to be processed.

A20. The algorithm and the flowchart are the same thing.
a. True
b. False

A21. The interactivity (structure) chart is developed by:
a. Using the similar types of modules for all programs.
b. Breaking the total solution into functional parts called modules.
c. Placing the names and numbers of the modules in rectangles which are then placed on the chart in a hierarchical fashion to show which modules process which other ones.
d. All of the above.

A22. Arrays are used:
a. When multiple values of a variable need to be saved in the computer's memory to be used later in the processing.
b. When a variable has more than one value.
c. Anytime when a set of numbers needs to be summed.
d. When the user does not know the number of values needed for a variable.

A23. Given a stack, what would the final value of the stack pointer be after the following instructions were executed:
PUSH 23, PUSH 35, PUSH 42, POP X, PUSH 20, POP X, POP X, PUSH 30

a. 1.
b. 2.
c. 3.

d. 4.
e. 5.

A2. The top of a binary tree is a branch.
a. True
b. False

A3. A node on a binary tree may be a leaf.
a. True
b. False

A4. A binary tree is the same as a linked list.
a. True
b. False

A5. A node at a higher level is called parent.
a. True
b. False

A6. The bottom position of the tree is called a root
a. True
b. False

A7. Stacks are used to process a binary tree.
a. True
b. False

A8. Algorithms:
a. Are the finished sets of programming instructions as written in a specific computer language
b. Are the set of step by step instructions divided into the specific parts, or modules.
c. Are the words written inside the flowchart.
d. Are the modules outlined in a data flow pattern

A9. The IPO chart:
a. Shows the input, the processing, the output, and the module numbers.
b. Information is from the structure chart and the program analysis chart.
c. Shows which module each processing step is found.
d. All of the above.

A10. The Problem Analysis Chart:
a. Has three parts: the given data, the required results, and the processing required.
b. Has four parts: the given data, the required results, the processing required, and the solution alternatives.
c. Helps to delete the words from a problem.
d. All of the above.
e. A and C.

A11. There are two branches from every node.
a. True
b. False

SECTION B (30 Marks)

Answer ALL Questions in the Answer Booklet.

B1. Explain the following terms:

a) Program. **[2 Marks]**

b) Coupling Diagram. **[2 Marks]**

c) Syntax. **[2 Marks]**

d) Module. **[2 Marks]**

e) Pseudocode. **[2 Marks]**

B2.

a) Define the data types of the following data items

I. Sum of money **[2 Marks]**

II. Quantity of shoes **[2 Marks]**

III. Account number **[2 Marks]**

B3. Define a variable name for each of the items in a) above? **[4 Marks]**

B4.

a) Why is problem analysis important? **[2 Marks]**

b) What is the difference between internal and external documentation?

[2 Marks]

c) Why is it important to test a solution before coding the solution? **[2 Marks]**

d) How do the problem-solving tools help in leading to a solution? **[4 Marks]**

SECTION C (30 Marks)

Answer ONE (1) Question Only in Your Answer Booklets.

C1. Bob would like to know what percentage of his income his rent is. Write a

solution that would calculate and print this percentage. (Hint: Percentage = Number/ Total * 100)

I. Draw the problem analysis chart for the problem stated above. **[6 Marks]**

II. Construct the Input-Processing-Output (I.P.O.) Chart for the chosen solution. **[6 Marks]**

III. Design an algorithm for the chosen solution. **[4 Marks]**

IV. Draw the flowchart for the chosen solution. **[4 Marks]**

C1. Complete the data file table below for the left and right pointers and draw the corresponding binary tree. **[20 Marks]**

RECORD	KEY	LEFT POINTER	RIGHT POINTER
1	A		
2	B		
3	C		
4	D		
5	E		
6	F		
7	G		
8	H		
9	I		
10	J		
11	K		
12	L		
13	M		

a) Write out the resulting traversals to your binary tree above for

I. Preorder, **[3 Marks]**

II. Postorder and **[3 Marks]**

III. Inorder **[4 Marks]**

C1. Identify a problem in your locality which a computer solution can be developed for and answer the questions below:

a) Write down the six problem-solving steps you will use to solve this problem. **[10 Marks]**

b) Write an algorithm for the chosen solution. **[5 Marks]**

c) Draw a flowchart for the chosen solution. **[7 Marks]**

d) Write a code (pseudocode) for the chosen solution. **[8 Marks]**