Uganda Martyrs University
Faculty of Science
Bsc. IT II, Bsc Gen. II and Dip CS.
CSC2103 Programming Data Structures and Algorithms
Final Exam

Instructions: 18 December 2012

Time 2 Hours
Answer all Questions.

1. Define the following terms: a). Data b). Data structure c) record d). Algorithm e) file (5Mks)

2. Write short notes on any 3 data structures. (5Mks)

3. Explain five data structure operations. (5Mks)

4. With Clear examples explain three different ways of writing arithmetic expressions. (5 Mks)
5. By inspection and hand translate the following infix expressions to prefix.
   a) (A+B)+(C-D)
   b) A-B/C
   c) A*B/C

(3Mks)

6. What are the two main measures for the efficiency of an algorithm (2 Mks)

7. Suppose we have an array implementation of a stack having 10 elements stored at STACK[0] through STACK[9] and MAXSTK= 20 If a procedure PUSH is applied to the STACK where will the new element be placed. (2 Mks).

8. Consider the following section of an algorithm:
   Create a stack to store characters which make up a word
   While (there are more characters in the word to read)
   { read a character and push it on to the stack }
   While (the stack is not empty)
   { write the stack's top character to the screen and pop the character off the stack}
What will be written on the screen if the input word is NEXTGEN (3 Mks)

9. Using a stack as the main tool evaluate the following infix expression K
   K: 25+12 / 2 ^2 * 10 (5Mks)

10. Consider the following DEQUEUE of Products allocated 6 Memory cells

LEFT: 4
RIGHT: 4 DEQUEUE : _____ , _____, _____, Salt,_____, _____,

Describe the DEQUEUE as the following Operations take place
   a. Four products milk, coffee, rice and Tea are added to the left.
   b. Two products are deleted from the left
   c. one product oil is added to right of the dequeue. (5Mks)

11. Given the following expression: A*B*C/D
   a) Give the tree T representation of the above expression.
   b) Give the preorder traversal of the above tree T
   c) Give the LINK representation of T
   d. List all the parents in T. (5Mks)

12. Apply the bubble sort algorithm to the following array D showing each pass separately.
   D: 9, 8, 1, 8 (5Mks)