

**Uganda Martyrs University**  
**Faculty of Science**  
**Data Structures and Algorithms**  
**BSc Gen, IT II & Dip CS Semester 1 Final Assessment 2007/2008**  
**Date: 12/12/2007** **Time 2.00-4.00pm**

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**Instructions:**

**Answer any 10 (Ten) Questions**

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1. Define the following terms:
  - a. Data
  - b. Data Structure
  - c. Algorithm.
  - d. Entity(4Marks)
2. Briefly describe any four Data structures and four data structure operations. (4 Marks)
3. Explain with examples the following terms:
  - a. Polish Notation
  - b. Reverse Polish Notation
  - c. Infix Notation.(4Marks)
4. Translate by inspection and hand the following infix expressions to prefix
  - a.  $(K+L) - (Q-R)$
  - b.  $(A/B)*C$(4 Marks)
5. Given the expression Q:  $((D*E)/M) - A$   
Use a stack to transform the above expression from Infix to post fix. (4Marks)
6. Evaluate the following Post fix expression P using a stack. (4Marks)  
P: 17 , 10, +, 8, 2, / , -
7. Suppose the marks obtained by students in Programming methodology I are stored in an array Marks as shown bellow:  
  
MARKS : 50, 60, 90, 45  
Apply bubble sort to the Array Marks showing each pass separately. (4Marks)
8. Give the difference between a queue, a priority queue and a dequeue. (4Marks)
9. Explain with examples the tree terms Copies and similar. (4 Marks)
10. Consider the following Queue of Products Where QUEUE is a circular array allocated 7 Memory cells  
  
FRONT: 2  
REAR : 4      QUEUE : \_\_\_\_\_, Sugar, Salt, Rice, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_,

Describe the Queue as the following Operations take place

- a. One Product is deleted
  - b. Two products Soap and Oil are added.
  - c. One product is deleted.
  - d. One more element is deleted
- (4Marks)

11. Consider the following deque of characters where DEQUE is a circular array allocated 6 memory locations

LEFT: 3

RIGHT: 3    DEQUE: \_\_\_\_\_, \_\_\_\_\_, H, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

Describe the deque as the following operations take Place

- a. Three letters A, L, I are added to the Left of the deque.
  - b. One letter N is added to the Right of the deque.
  - c. One letter is deleted from the left of the deque.
  - d. S is added to the Right.
- (4 Marks)

12. Define and explain with a diagram the following tree terminologies.

- a. Edge
  - b. Path
  - c. Leaf
  - d. Branch
  - e. Level Number
  - f. Depth of A tree.
- (4Marks)