Course Title: Data Structures & Algorithms Analysis **Date: 18 / 04 / 2018** **No. of Questions: 2Questions** **Time: 1 hour** **Using Calculator (No)**	**University of Palestine** **Second Midterm Exam** **2nd semester 2017/2018** **Total Grade: 15**	**Instructor Name:** Eng. Eman Alajrami **Student No.: _____** **Student Name: _____** **College Name: IT** **Dep. / Specialist: _____** **Using Dictionary (No)**

First Question	No. of Branches (5)	(2.5 marks)

Choose the correct answer:

1. In the linked list implementation of the stack class, where does the push method place the new entry on the linked list?
   A. At the head
   B. At the tail
   C. After all other entries that are greater than the new entry.
   D. After all other entries that are smaller than the new entry.

2. If the characters 'D', 'C', 'B', 'A' are placed in a queue (in that order), and then removed one at a time, in what order will they be removed?
   A. ABCD
   B. ABDC
   C. DCAB
   D. DCBA

3. In the linked list implementation of the queue class, where does the insert method place the new entry on the linked list?
   A. At the head
   B. At the tail
   C. After all other entries that are greater than the new entry.
   D. After all other entries that are smaller than the new entry.

4. If data is a circular array of CAPACITY elements, and rear is an index into that array, what is the formula for the index after rear?
   A. (rear % 1) + CAPACITY
   B. rear % (1 + CAPACITY)
   C. (rear + 1) % CAPACITY
   D. rear + (1 % CAPACITY

5. I have implemented the queue with a linked list, keeping track of a front node and a rear node with two reference variables. Which of these reference variables will change during an insertion into a NONEMPTY queue?
   A. Neither changes
   B. Only front changes.
   C. Only rear changes.
   D. Both change.

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Second Question	**No. of Branches (3)**	**(6 marks)**

1. Write a recursive method with one positive int parameter called n. The method will write 2^n-1 integers (where ^ is the exponentiation operation). Here are the patterns of output for various values of n: (2 marks)
   n=1: Output is: 1
   n=2: Output is: 1 2 1
   n=3: Output is: 1 2 1 3 1 2 1
   n=4: Output is: 1 2 1 3 1 2 1 4 1 2 1 3 1 2 1
   and so on. Note that the output for n always consists of the output for n-1, followed by n itself, followed by a second copy of the output for n-1.

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2. What are the steps to inserting a new item at the head of a single linked list? (2 marks)

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3. Suppose that p is a reference to an IntNode in a linked list, and it is not the tail node. What are the steps to removing the node after p? (2 marks)

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4. Write the method push in the linked stack. (2 marks)

5. Write the method dequeue (delete) from the linked stack. (2 marks)

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6. Write a method to search a single linked list of integers for a specific value. The method should return the number of times the value exists in the linked list. (2.5 marks)

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Learning never exhausts the mind.
Leonardo da Vinci

Good Luck